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THE STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM FOR THE ATOMIC ABSORPTION SPECTROPHOTOMETER
PART III - PROGRAM DOCUMENTATION

by

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16. ABSTRACT

This report contains complete documentation for the 15 programs and 11 data files of the EPA Atomic Absorption Instrument Automation System. The system incorporates the following major features: 1) multipoint calibration using first, second, or third degree regression or linear interpolation, 2) timely quality control assessments for spiked samples, duplicates, laboratory control standards, reagent blanks, and instrument check standards, 3) reagent blank subtraction, and 4) plotting of calibration curves and raw data peaks.

The programs of this system are written in Data General Extended BASIC, Revision 4.3, as enhanced for multi-user, real-time data acquisition. They run in a Data General Nova 840 minicomputer under the operating system RDOS, Revision 6.2.

In this document there is a functional description, a symbol definitions table, a functional flowchart, a program listing, and a symbol cross reference table for each program. The structure of every data file is also detailed.

Two related publications are "THE STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM FOR THE ATOMIC ABSORPTION SPECTROPHOTOMETER PART I - FUNCTIONAL SPECIFICATIONS" and "THE STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM FOR THE ATOMIC ABSORPTION SPECTROPHOTOMETER PART II - USER'S GUIDE."

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FOREWORD

Environmental measurements are required to determine the quality of ambient waters and the character of waste effluents. The Environmental Monitoring and Support Laboratory - Cincinnati, conducts research to:

- Develop and evaluate techniques to measure the presence and concentration of physical, chemical, and radiological pollutants in water, wastewater, bottom sediments, and solid waste.
- Investigate methods for the concentration, recovery, and identification of viruses, bacteria and other microbiological organisms in water; and to determine the responses of aquatic organisms to water quality.
- Develop and operate an Agency-wide quality assurance program to assure standardization and quality control of systems for monitoring water and wastewater.
- Develop and operate a computerized system for instrument automation leading to improved data collection, analysis, and quality control.

This report was developed in the Advanced Instrumentation Section of the Environmental Monitoring and Support Laboratory in the interest of advancing laboratory techniques and quality control through computerization.

Robert L. Booth

Robert L. Booth
Acting Director
Environmental Monitoring and Support
Laboratory - Cincinnati

ABSTRACT

This book contains complete documentation for the 15 programs and 11 data files of the EPA Atomic Absorption Instrument Automation System. This system can receive lists of samples from the Sample File Control System and return the measured concentrations to that system. It is capable of interfacing a number of commercially available atomic absorption instruments to the standard EPA laboratory automation system. It incorporates the following major features: 1) multipoint calibration using first, second, or third degree regression or linear interpolation, 2) timely quality control assessments for spiked samples, duplicates, laboratory control standards, reagent blanks, and instrument check standards, 3) reagent blank subtraction, and 4) plotting of calibration curves and raw data peaks.

The programs of this system are written in Data General Extended BASIC, Revision 4.3, as enhanced for multiuser, real-time data acquisition. They run in a Data General Nova 840 minicomputer under the operating system RDOS, Revision 6.2.

In this document, there is a functional description, a symbol definitions table, a functional flowchart, a program listing, and a symbol cross reference table for each program. The structure of every data file is also detailed.

Two related publications are "The Standard Calibration Instrument Automation system for the Atomic Absorption Spectrophotometer, Part I - Functional Specifications" and "The Standard Calibration Instrument Automation System for the Atomic Absorption Spectrophotometer, Part II - User's Guide."

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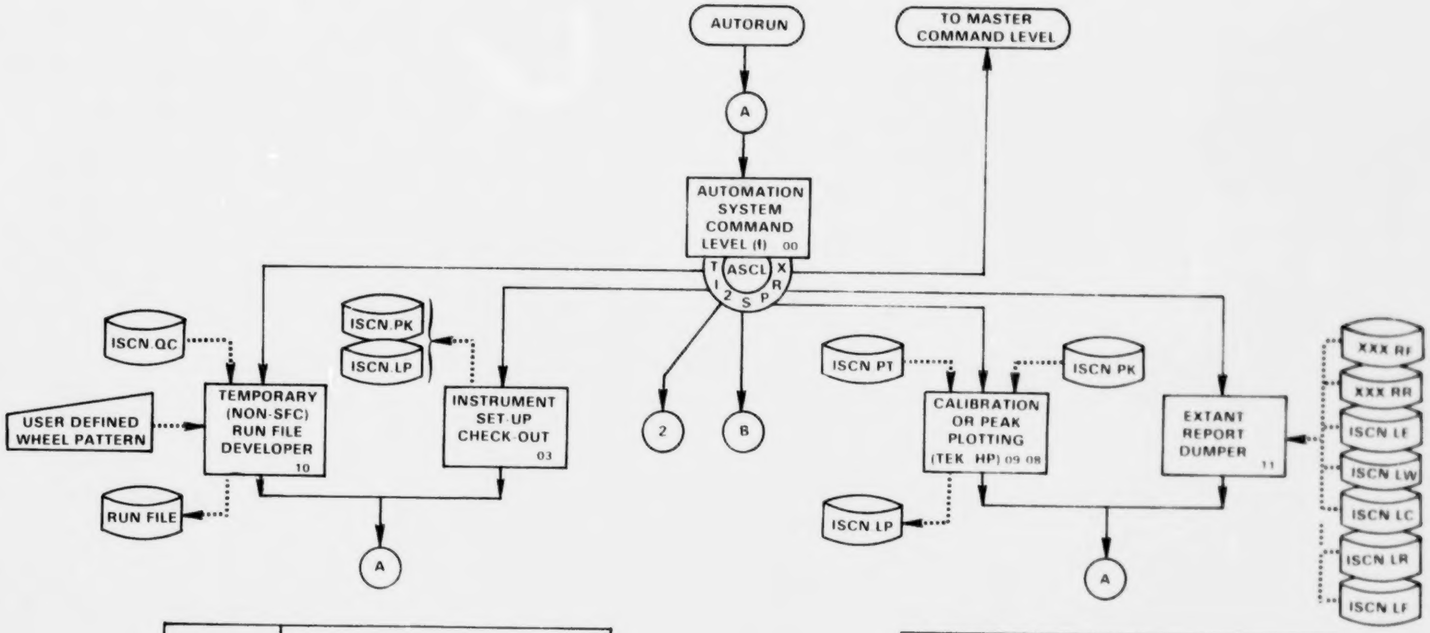
SECTION 1

INTRODUCTION

The Standard Calibration Instrument Automation System (ISC) is a set of up to 15 computer programs which perform extensive processing of data from a commercially available atomic absorption spectrophotometer system. This book contains the documentation for the ISC system programs. Two other related publications contain the functional specifications and user's guide for the ISC system.

The ISC is written in Data General Extended BASIC, Revision 4.3, under the operating system RDOS, Revision 6.2. The 13 major programs are named ISCN.00 through ISCN.12. The chaining relationships and functions of these programs are shown in Figure 1.

The ISC system is designed to be easily modified to accomodate a number of available standard calibration instrument systems. The data acquisition programs ISCN.03 and ISCN.04 may be replaced or modified to allow the system to acquire data from any analog or digitally interfaced instrument. These modules may also be modified to acquire reduced absorbance data from instruments equipped with microprocessors. This booklet details the BASIC software system as it relates to the Perkin Elmer 5000 atomic absorption instrument application, while Appendix A describes some proposed data acquisition and reduction modules for other commercially available instruments. This booklet is not intended to describe interface or control hardware,[1,2] nor will it detail any real-time system software.[3] For more information on these subjects the reader should consult the reference materials cited in this booklet.


AUTORUN
TO MASTER COMMAND LEVEL
A
AUTOMATION SYSTEM COMMAND LEVEL (I) 00
T ASCL X
I R
2 S P
ISCN.QC
USER DEFINED WHEEL PATTERN
TEMPORARY (NON-SFC) RUN FILE DEVELOPER 10
RUN FILE
ISCN.PK
ISCN.LP
INSTRUMENT SET-UP CHECK-OUT 03
A
2
B
ISCN PT
ISCN PK
CALIBRATION OR PEAK PLOTTING (TEK HP) 09 08
ISCN LP
EXTANT REPORT DUMPER 11
A
XXX RF
XXX RR
ISCN LE
ISCN LW
ISCN LC
ISCN LR
ISCN LF

ISCN.##	Program Names (## in lower left corners)
ISCN.ID	Sample Identifier File
ISCN.DF	Sample Absorbance Data File
ISCN.TR	Instrument-Run Transfer File
ISCN.LW	Wheel Pattern List
ISCN.LC	Calibration Table List
ISCN.LR	Run Status Report List

ISCN PT	Plot File of Calibration Data
ISCN PK	Plot File of Raw Peak Data
ISCN LP	Crude Peak Plot List
ISCN LE	Run File Error List
ISCN LF	Final (Non-SFC) Report List
XXX RF	SFC or Non SFC Run File
XXX RR	Run Results File (SFC Final Report)

Figure 1-a. Automation system programs, chaining, and files (ASCL).

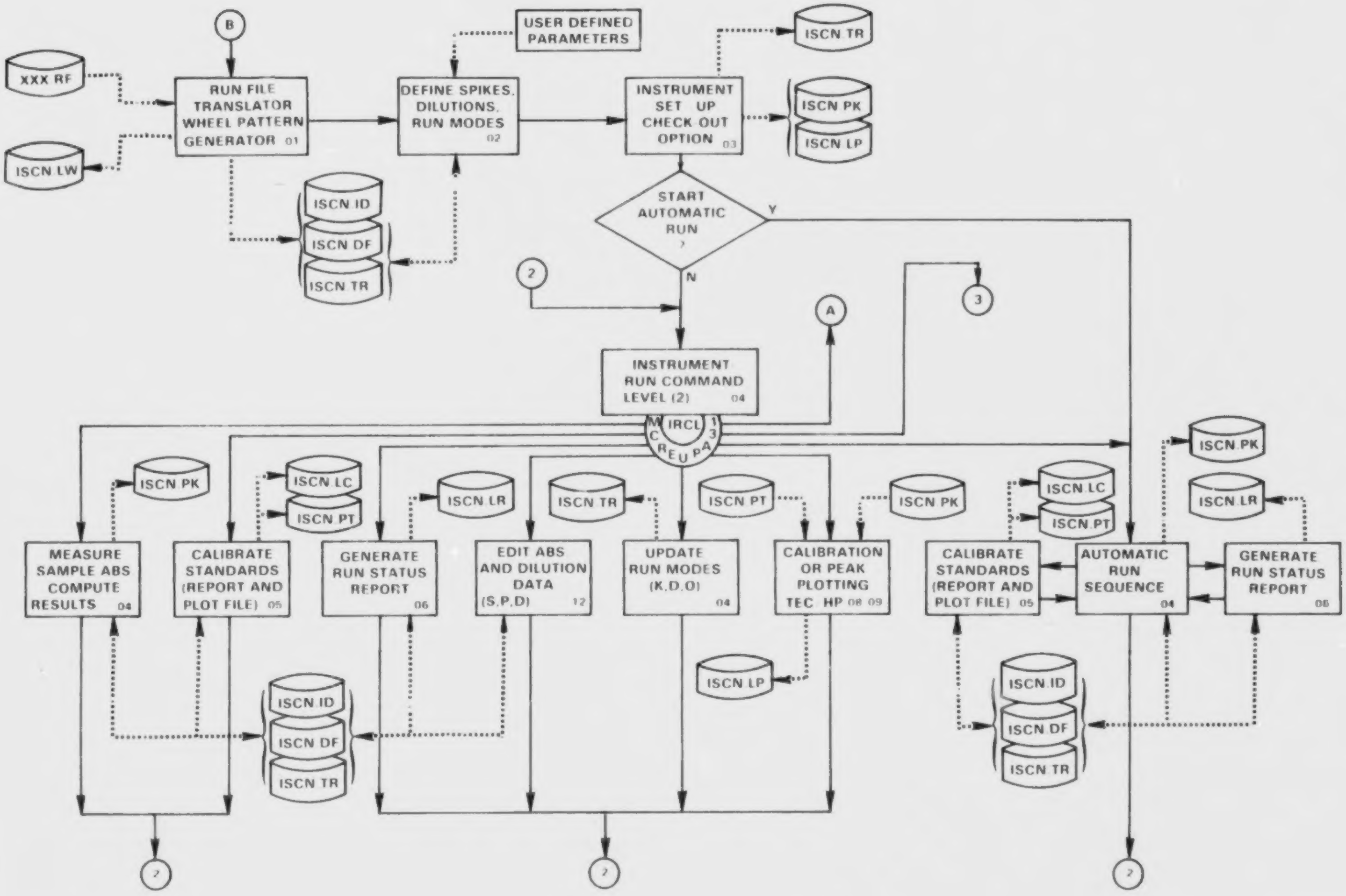

B
XXX RF
ISCN LW
RUN FILE TRANSLATOR WHEEL PATTERN GENERATOR 01
ISCN ID
ISCN DF
ISCN TR
USER DEFINED PARAMETERS
DEFINE SPIKES, DILUTIONS, RUN MODES 02
ISCN TR
ISCN PK
ISCN LP
INSTRUMENT SET UP CHECK OUT OPTION 03
START AUTOMATIC RUN ?
Y
N
2
3
A
INSTRUMENT RUN COMMAND LEVEL (2) 04
IRCL
M
C
R
E
U
P
A
3
1
MEASURE SAMPLE ABS COMPUTE RESULTS 04
ISCN PK
CALIBRATE STANDARDS (REPORT AND PLOT FILE) 05
ISCN LC
ISCN PT
GENERATE RUN STATUS REPORT 06
ISCN LR
EDIT ABS AND DILUTION DATA (S,P,D) 12
ISCN TR
UPDATE RUN MODES (K,D,O) 04
ISCN PT
ISCN PK
CALIBRATION OR PEAK PLOTTING TEC HP 08 09
ISCN LP
ISCN ID
ISCN DF
ISCN TR
CALIBRATE STANDARDS (REPORT AND PLOT FILE) 05
ISCN LC
ISCN PT
AUTOMATIC RUN SEQUENCE 04
ISCN PK
ISCN LR
GENERATE RUN STATUS REPORT 06
ISCN ID
ISCN DF
ISCN TR
2
2
2

Figure 1-b. Automation system programs, chaining, and files (IRCL).

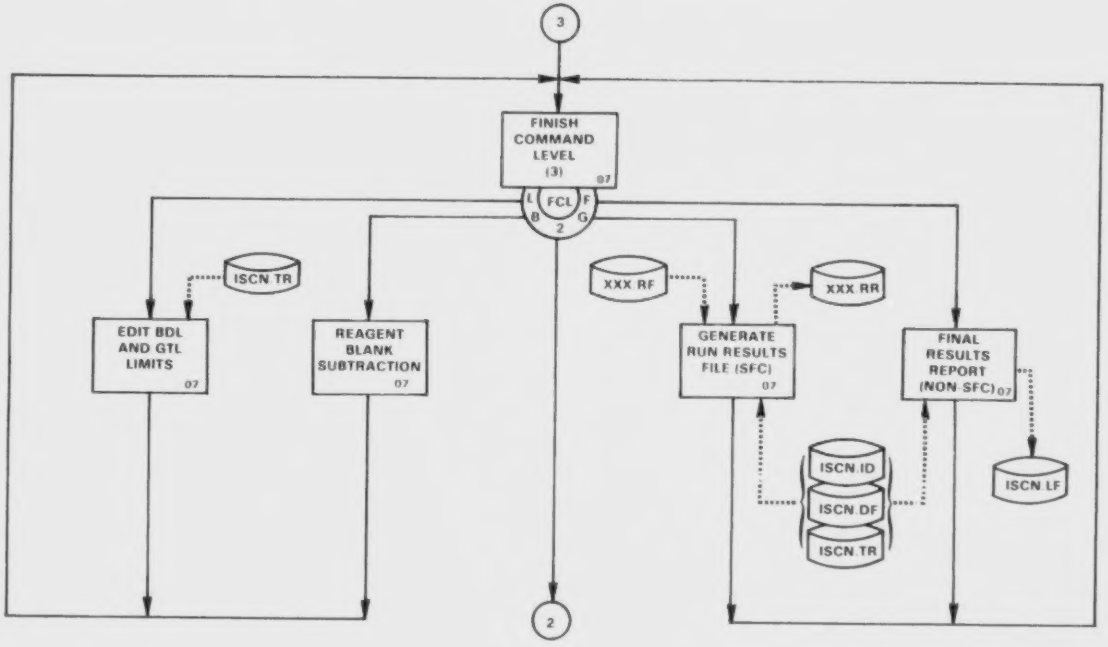

3
FINISH COMMAND LEVEL (3) 07
L
FCL
F
B
G
2
ISCN.TR
EDIT BDL AND GTL LIMITS 07
REAGENT BLANK SUBTRACTION 07
XXX RF
GENERATE RUN RESULTS FILE (SFC) 07
XXX RR
FINAL RESULTS REPORT (NON-SFC) 07
ISCN.ID
ISCN.DF
ISCN.TR
ISCN.LF
2

Figure 1-c. Automation system programs, chaining and files (FCL).

SECTION 2

AUTORUN - THE SFC AUTOMATION SYSTEM CONNECTOR

The Sample File Control Master Command Level (SFCMCL)[4] foreground NOVA system is linked to the automated instrument system through a program titled AUTORUN. This program is accessed only from the SFCMCL INITIALIZE program and introduces the user to the flameless atomic absorption standard calibration system. ISCN.00 program is accessed through a CHAIN from AUTORUN. If the ISCN.00 is not found, AUTORUN chains back to the INITIALIZE program which invokes SFCMCL. Figure 2 shows the structure of the SFCMCL system with its access to the AUTORUN connector.

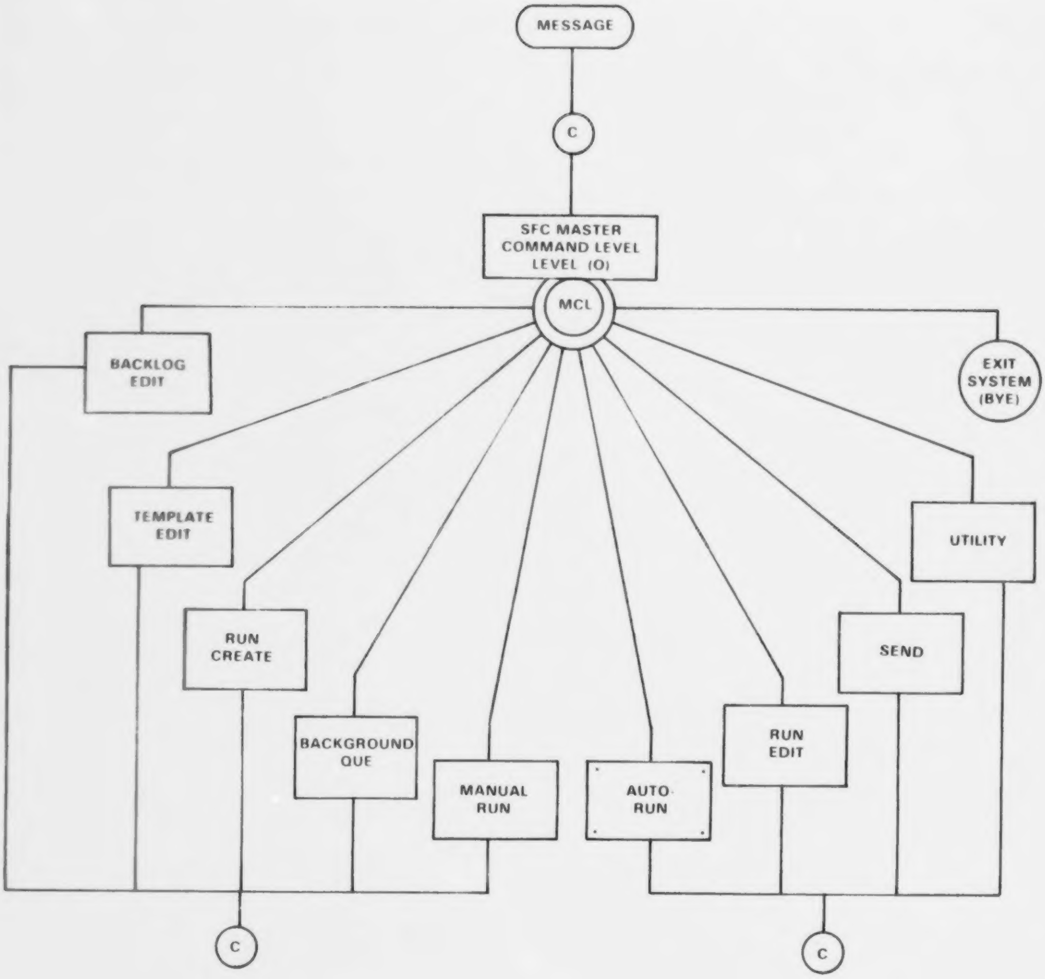

MESSAGE
C
SFC MASTER COMMAND LEVEL LEVEL (O)
MCL
BACKLOG EDIT
EXIT SYSTEM (BYE)
TEMPLATE EDIT
UTILITY
RUN CREATE
SEND
BACKGROUND QUE
MANUAL RUN
AUTO RUN
RUN EDIT
C
C

Figure 2. Sample File Control Master Command Level framework.

```
 STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
8/19/1980                                                PAGE  1
                 PROGRAM LISTING FOR AUTORUN.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: AUTORUN - SFC/FOREGROUND NOVA CONNECTOR        *
0040 REM *            TO ISC SYSTEM, CHAINS ISCN.00                  *
0050 REM *   BY D.RYAN (UCCC), FEBRUARY 21, 1980                     *
0060 REM *   MOST RECENT REVISION: FEBRUARY 21, 1980                 *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 CLOSE
0090 NOESC
0100 DIM S$[10],P$[13]
0110 PAGE =74
0130 ON ERR THEN GOTO 0260
0140 OPEN FILE[1,3],"INST.NM"
0150 LREAD FILE[1],S$
0160 CLOSE FILE[1]
0162 PRINT
0170 PRINT "*************************"
0180 PRINT "*         ";S$;"         *"
0190 PRINT "* STANDARD CALIBRATION  *"
0200 PRINT "* INSTRUMENT AUTOMATION *"
0210 PRINT "*        SYSTEM         *"
0220 PRINT "*************************"
0250 CHAIN "ISCN.00"
0260 ON ERR THEN GOTO 0320
0270 CLOSE
0280 PRINT
0290 PRINT "<7>AUTOMATION SYSTEM NOT ACCESSIBLE!<7>"
0300 PRINT
0310 CHAIN "INITIALIZE"
0320 BYE
0330 STOP




1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
 STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
8/19/1980                                                PAGE  2
                 SYMBOL TABLE FOR AUTORUN.AS

SYMBOL   REFERENCES
------   ---------------------------------------------------------------
 0260    0130
 0320    0260
 FL#1    0140   0150   0160
 P$      0100
 S$      0100   0150   0180
```

TABLE 1. SYMBOL DEFINITIONS FOR AUTORUN

S$	the name of the resident instrument directory

SECTION 3

ISCN.00 - THE AUTOMATION SYSTEM COMMAND ROUTER

The ISCN.00 program is capable of routing control to other programs which will perform utility functions. It is also capable of accessing the Instrument RUN Command Level (IRCL) router either directly or indirectly. Six functions may be performed from the Automation System Command Level (ASCL) with additional features provided for HELP and exit to the SFCMCL.

The ISCN.00 program first presents the ASCL command line to the user. The actual input line is equipped with a time out which, if triggered, will force exit to SFCMCL through the INITIALIZE program. The ISCN.00 program facilitates the CHAINing to the following programs: ISCN.01, ISCN.03, ISCN.04, ISCN.08, ISCN.09, ISCN.10, and ISCN.11.

The CHAIN to the calibration plot program ISNC.08 is qualified with a GOTO since ISCN.08 is multiply entrant. In addition, the peak plot program ISCN.09 may not be available in the system if the instrument outputs a fully reduced absorbance value as in the case of the PE5000.

The ISCN.00 program operates in a straight forward manner except in the case where direct access of the ISCN.04 program is requested with the '2' command. Instrument RUN Command Level (IRCL(2)) may only be accessed from the ASCL(1) if the following conditions are met:

a) the system data files (ISCN.ID, ISCN.DF, AND ISCN.TR) must exist;

b) the Run File name specified in the transfer file ISCN.TR must exist in the directory either as a Run File (.RF) or as a Run Results File (.RR);

c) the Run File or Run Results File identifier located in the header record must match the date/time code maintained in the transfer file ISCN.TR; and

d) the generic PARMETH Code in the Run File or Run Results File must match the PARMETH code maintained in the transfer file ISCN.TR.

In fact, the only way that the ISCN.04 program can be accessed directly from the ASCL is if the current RUN status is equivalent to the conditions present when the IRCL was last exited. This means that pre-RUN processing must have previously been performed through the 'S' command (out of the ASCL) before re-entry to the IRCL will be allowed.

Figure 3 depicts the logical flow of ISCN.00. Notice that the only upward exit allowed from the ASCL is to the SFCMCL by CHAINing the INITIALIZE program.

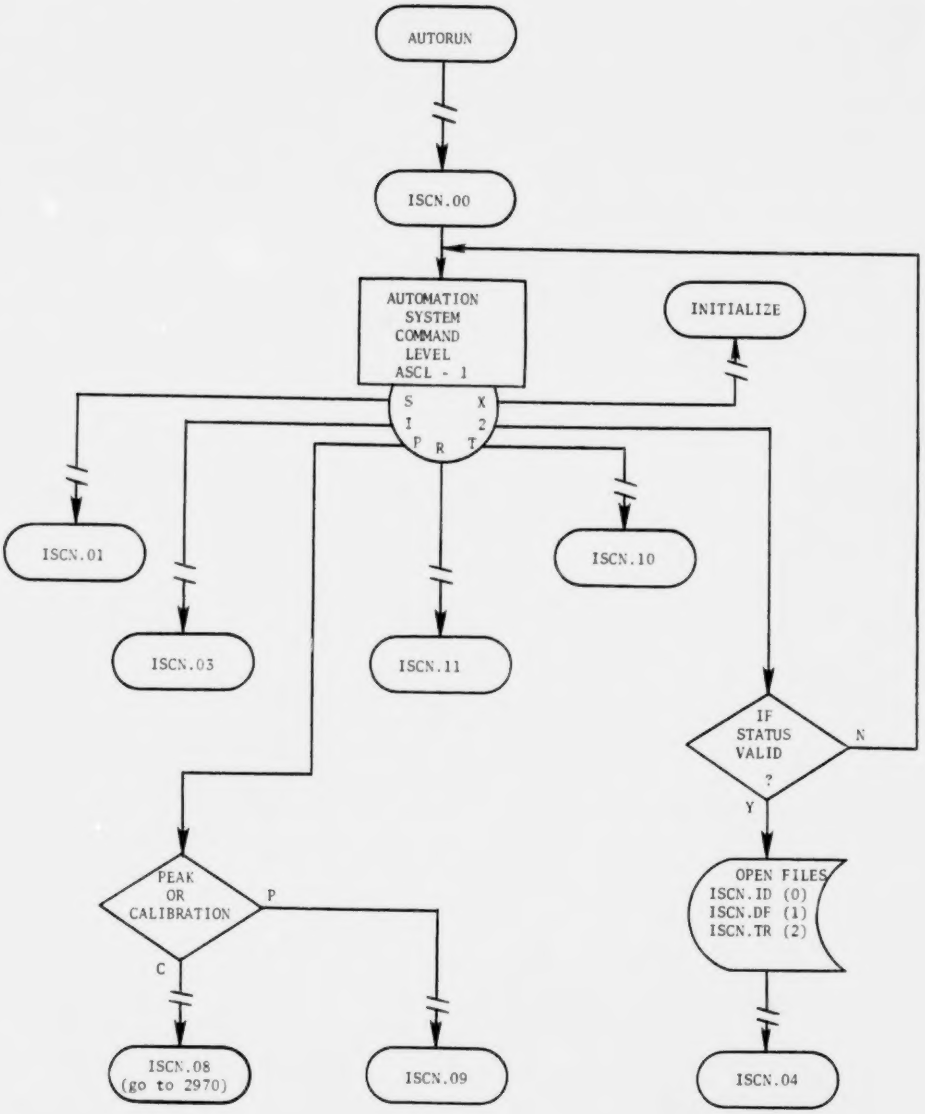

AUTORUN
ISCN.00
AUTOMATION SYSTEM COMMAND LEVEL ASCL - 1
S
I
P
R
X
2
T
INITIALIZE
ISCN.01
ISCN.03
ISCN.11
ISCN.10
IF STATUS VALID ?
N
Y
OPEN FILES
ISCN.ID (0)
ISCN.DF (1)
ISCN.TR (2)
PEAK OR CALIBRATION
P
C
ISCN.08 (go to 2970)
ISCN.09
ISCN.04

Figure 3. Program ISCN.00 -- Automation System Command Level router.

TABLE 2. SYMBOL DEFINITIONS FOR ISCN.00

A$	the user's answer to the command line prompt
A1$	dummy string variable
B$	the user's answer to the option line prompt
D0$	the date code carried for the last used Run File
ES	the ESCape counter
F0$	the name for the system ID. file
F1$	the name for the system data file
F2$	the name for the system transfer file
F7$	the name for the current Run File
I	a counter
I$	the contents of a Run File record (80 byte)
I2	a raw peak data parameter
K	the Run File/Run Results File existence-flag
M0	the computation mode flag
M1	the sequencing mode flag
M2	the data acquisition mode flag
M5	the output mode flag
N0	a raw peak data parameter
N1	a raw peak data parameter
N2	a raw peak data parameter
O$	the command line option-string
P$	the general system name
P2$	the name of the program to be CHAINed
R0$	the name of the current PARMETH code
R1	the replicate counter
Z7	a raw peak data parameter
Z8	a raw peak data parameter
Z9	the real-time injection counter

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  1
                     PROGRAM LISTING FOR ISCN00.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.00 - AUTOMATION SYSTEM CAMMAND LEVEL      *
0040 REM *            ROUTER, CHAINS ALL AVAILABLE SYSTEM OPTIONS    *
0050 REM *   BY: D.RYAN (UCCC) FEBRUARY 21, 1980                     *
0060 REM *   MOST RECENT REVISION: APRIL 14, 1980                    *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 CLOSE
0090 DIM F7$[13],D0$[20],I$[80]
0100 DIM A$[5],P$[13],0$[10],P2$[13]
0110 LET 0$="SIPRXT2"
0120 LET P$="ISCN"
0130 ON ERR THEN STOP
0140 ON ESC THEN GOTO 0130
0150 CLOSE
0160 ESC
0170 GOTO 0250
0180 PRINT "   S  - START INSTRUMENT AUTOMATION RUN SEQUENCE"
0190 PRINT "   I  - INSTRUMENT CHECKOUT"
0200 PRINT "   P# - PLOT CALIBRATION OR PEAK DATA (C OR P)"
0210 PRINT "   R  - DUMP REPORT FILE (SELECTABLE)"
0220 PRINT "   X  - EXIT AUTOMATION SYSTEM (TO MASTER COMMAND LEVEL)"
0230 PRINT "   T  - TEMPORARY RUN FILE CREATOR (NON-SFC)"
0240 PRINT "   2  - ACCESS IRCL(2) AT PREVIOUS RUN STATUS"
0250 PRINT
0260 TIME =600
0270 PRINT "AUTOMATION SYSTEM OPTION: ([H]SIPRXT2) ";
0280 ON ERR THEN GOTO 0300
0290 TINPUT "> ",A$;
0300 ON ERR THEN STOP
0310 PRINT
0320 IF SYS(7)<>60 THEN GOTO 0360
0330 PRINT
0340 PRINT "NO ACTIVITY FOR TEN MINUTES!<7>"
0350 GOTO 1230
0360 PRINT "";
0370 REM *****  THESE LINES MAY BE REMOVED FOR NON-ENTRY TO BCL  *****
0380 IF A$<>"DPR" THEN GOTO 0420
0390 ESC
0400 NEW
0410 REM *************************************************************
0420 IF A$<>"" THEN IF A$<>"H" THEN GOTO 0470

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  2
                     PROGRAM LISTING FOR ISCN00.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0430 GOTO 0180
0440 PRINT
0450 PRINT "<7>INVALID RESPONSE!<7>"
0460 GOTO 0130
0470 ON POS(0$,A$[1,1],1) THEN GOTO 0490, 0510, 0530, 0710, 1230, 0730
*      , 0750
0480 GOTO 0440
0490 LET P2$=P$,".01"
0500 GOTO 1160
0510 LET P2$=P$,".03"
0520 GOTO 1160
0530 LET B$=""
0540 IF LEN(A$)>1 THEN LET B$=A$[2,2]
0550 IF LEN(B$)>0 THEN GOTO 0620
0560 PRINT
0570 PRINT "CALIBRATION OR PEAK PLOTTING ([C] OR P) ";
0580 ON ERR THEN GOTO 1310
0590 INPUT "> ",B$;
0600 ON ERR THEN STOP
0610 PRINT
0612 IF LEN(B$)=0 THEN LET B$="C"
0620 ON POS("CP",B$[1,1],1) THEN GOTO 0650, 0690
0630 PRINT "<7>";
0640 GOTO 0560
0650 LET P2$=P$,".08"
0660 ON ERR THEN GOTO 1190
0670 NOESC
0680 CHAIN P2$ THEN GOTO 2970
0690 LET P2$=P$,".09"
0700 GOTO 1160
0710 LET P2$=P$,".11"
0720 GOTO 1160
0730 LET P2$=P$,".10"
0740 GOTO 1160
0750 LET K=0
0760 LET F0$=P$,".ID"
0770 LET F1$=P$,".DF"
0780 LET F2$=P$,".TR"
0790 ON ERR THEN GOTO 0810
0800 RENAME F2$,F2$
0810 ON ERR THEN STOP
0820 IF SYS(7)=-9 THEN GOTO 0840

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                          PAGE  3
                     PROGRAM LISTING FOR ISCN00.AS

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
0830 GOTO 1190
0840 OPEN FILE[0,0],F0$,20
0850 OPEN FILE[1,0],F1$
0860 OPEN FILE[2,0],F2$
0870 READ FILE[2,1],A1$,F7$,A1$,A1$,A1$,R0$,D0$
0880 ON ERR THEN GOTO 0910
0890 LET K=K+1
0900 RENAME F7$,F7$
0910 ON ERR THEN STOP
0920 IF SYS(7)=-9 THEN GOTO 0940
0930 GOTO 1120
0940 OPEN FILE[6,3],F7$,80
0950 LREAD FILE[6],I$
0960 CLOSE FILE[6]
0970 IF I$[24,30]<>R0$ THEN GOTO 1190
0980 FOR I=3 TO 16
0990   IF POS("0 ",I$[I,I],1)>0 THEN GOTO 1010
1000   IF I$[I,I]<>D0$[I-2,I-2] THEN GOTO 1190
1010 NEXT I
1060 LET P2$=P$,".04"
1070 NOESC
1080 ON ERR THEN GOTO 1100
1090 CHAIN P2$
1100 CLOSE
1110 GOTO 1190
1120 ON ERR THEN STOP
1130 IF K>1 THEN GOTO 1190
1140 LET F7$=F7$[1,LEN(F7$)-3],".RR"
1150 GOTO 0880
1160 NOESC
1170 ON ERR THEN GOTO 1190
1180 CHAIN P2$
1190 ON ERR THEN STOP
1200 PRINT
1210 PRINT "<7>OPTION CURRENTLY UNAVAILABLE!<7>"
1220 GOTO 0130
1230 NOESC
1240 CLOSE
1250 PRINT
1260 PRINT "NOW EXITING AUTOMATION SYSTEM."
1270 ON ERR THEN GOTO 1290
1280 CHAIN "INITIALIZE"

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                          PAGE  4
                     PROGRAM LISTING FOR ISCN00.AS

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
1290 ON ERR THEN STOP
1300 BYE
1310 PRINT "<7> >";
1320 RETRY

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  5
                    SYMBOL TABLE FOR ISCN00.AS

SYMBOL    REFERENCES
------    --------------------------------------------------------------
 0130   0140  0460  1220
 0180   0430
 0250   0170
 0300   0280
 0360   0320
 0420   0380
 0440   0480
 0470   0420
 0490   0470
 0510   0470
 0530   0470
 0560   0640
 0620   0550
 0650   0620
 0690   0620
 0710   0470
 0730   0470
 0750   0470
 0810   0790
 0840   0820
 0880   1150
 0910   0880
 0940   0920
 1010   0990
 1100   1080
 1120   0930
 1160   0500  0520  0700  0720  0740
 1190   0660  0830  0970  1000  1110  1130  1170
 1230   0350  0470
 1290   1270
 1310   0580
 2970   0680
 A$     0100  0290  0380  0420  0470  0540
 A1$    0870
 B$     0530  0540  0550  0590  0612  0620
 D0$    0090  0870  1000
 F0$    0760  0840
 F1$    0770  0850
 F2$    0780  0800  0860
 F7$    0090  0870  0900  0940  1140
 FL#0   0840
 FL#1   0850
 FL#2   0860  0870
 FL#6   0940  0950  0960
 I      0980  0990  1000  1010
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  6
                    SYMBOL TABLE FOR ISCN00.AS

SYMBOL    REFERENCES
------    --------------------------------------------------------------
 I$     0090  0950  0970  0990  1000
 K      0750  0890  1130
 O$     0100  0110  0470
 P$     0100  0120  0490  0510  0650  0690  0710  0730  0760  0770
        0780  1060
 P2$    0100  0490  0510  0650  0680  0690  0710  0730  1060  1090
        1180
 R0$    0870  0970
```

SECTION 4

ISCN.01 - THE RUN FILE TRANSLATOR AND WHEEL PATTERN GENERATOR

The ISCN.01 program is the first program which is executed in preparation for a RUN. Its purpose is to translate and assimilate a Run File and generate a wheel pattern at the analyst's request. Figure 4 shows the function and flow of the ISCN.01 program.

The first task of the ISCN.01 program is to open the three system data files (ISCN.ID, ISCN.DF, and ISCN.TR). (If the system has never been used before, ISCN.01 will initialize the contents of the transfer file (ISCN.TR). It will then delete the old calibration plot file.

The Run File name is acquired from the analyst and the program certifies its acceptability. The system will supply an '.RF' extension in those cases where the analyst only enters the proper name. The system will also accept Run File names with an '.RR' extension but will not supply an '.RR' extension to a proper name.

Once the Run File existence has been certified, the program translates each record and assimilates the information into the system data files. Since Run File record types are specified in column one of each record, the ISCN.01 program is equipped with a module for deciphering each of the four record types it expects to see in a Run File. A type 1 header record must be the first record in the file. From it, the system will acquire the Run File identifier, the PARMETH code, and the initials of the person who generated the Run File.

After the header record has been deciphered, the program reads and translates each Run File record until an end-of-file (EOF) is detected, or until an error is detected in form or content. In the last case, the translator is abruptly terminated.

The major distinguishing feature of each record is the run file record type. The type 1 header record has been described above. Type 2 and type 3 records contain information on the actual samples contained in the wheel pattern while type 4 records contain quality control information. As each record is translated, the information is coded and written into the ISCN.DF data file. This file is numbered by wheel position and contains fields in the D1 array for Run File record number, sample type, QC pointer, known value and dilution data, replicate absorbance measurements, and quality control limits. Data from more than one Run File record may be needed to fully define a sample in the wheel.

Numerical values for the sample types encountered in translation are defined as follows:

0 - Timing Set Standard (not used)
1 - Calibration Standard
2 - Unknown Sample
3 - Spiked Unknown
4 - Check Standard
5 - Duplicate Unknown
6 - Control Standard
7 - Reagent Blank
9 - Instrument Blank

As the Run File is translated, the sample type identifier is determined and assigned to array location D1(3). In addition, if the sample is a primary member of a QC-set then the D1(2) array value will be a -1 and if the sample is a secondary member of a QC-set the D1(2) array value will be a pointer variable locating the wheel position of the primary QC-set member.

Known values for calibration and control standard concentrations are assigned to array location D1(5) and the D1(4) array location is initialized to 1 for dilution factor usage.

The QC limit accumulator requires special attention. Since QC limit records are expected after every primary member of a QC set, and since the number of limit records vary, the number of expected records is determined through the L array as computed by the position of the QC code (I1$(12,14)) in the L$ array. The F3 flag is important in QC limit record assimilation since it is set after a primary member of a QC set is processed. The F3 flag is reset after the expected number of records has been processed.

A final point worth noting in the Run File translator is the assignment of the pointer variable D1(2). If the sample is a duplicate unknown, a spiked unknown, or a check standard, the program will review the wheel positions of previous samples to locate the primary member of the QC set. In the case of duplicates and spikes, the program will step backwards from the current wheel position while, with a check standard, the program will start with the first position in the wheel and step forward to the current position.

On completing the translation process, the program loads the transfer file with pertinent RUN information. The most important parameter is the position after the last standard in the wheel. This position will be used in a subsequent automatic analysis sequence to indicate where calibration is to occur.

The standard list-file output subroutine is available either for generating a Run File error list or for generating the wheel pattern acquired from the Run File. This subroutine is equipped with delay/retry capabilities in case the line printer is in use.

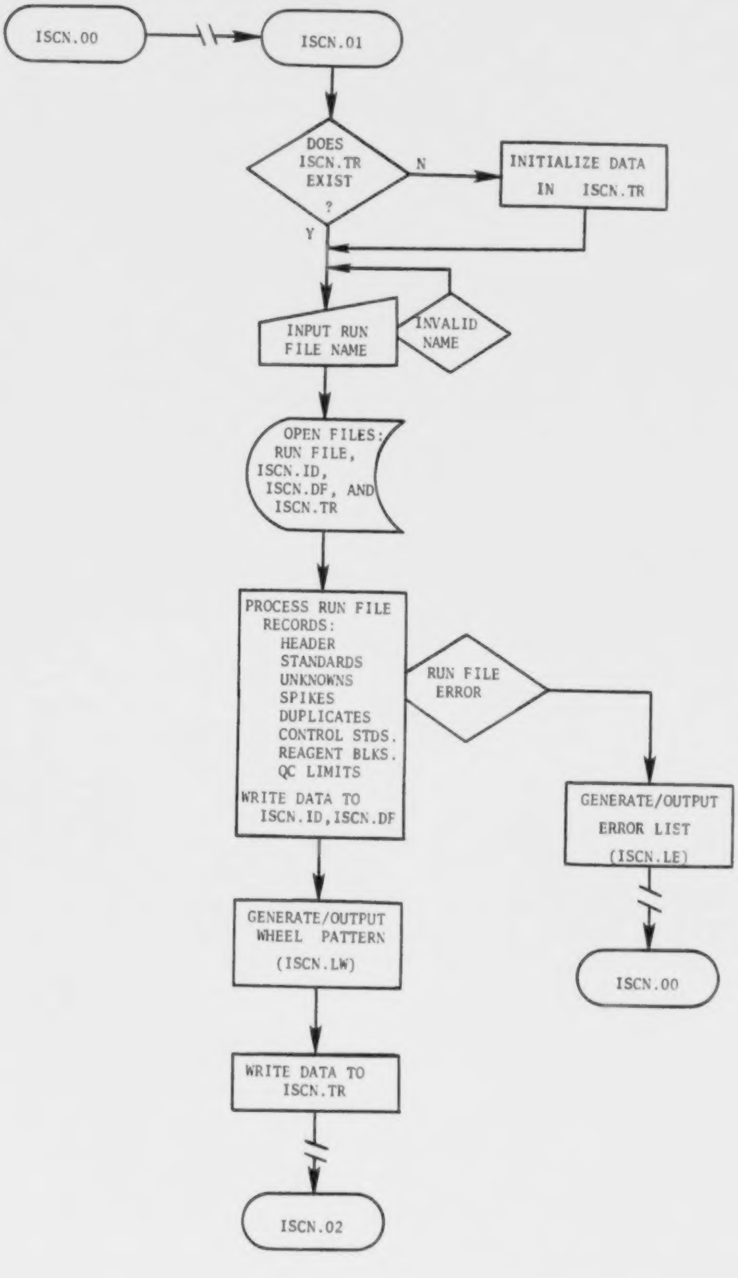

ISCN.00
ISCN.01
DOES ISCN.TR EXIST ?
N
Y
INITIALIZE DATA IN ISCN.TR
INPUT RUN FILE NAME
INVALID NAME
OPEN FILES: RUN FILE, ISCN.ID, ISCN.DF, AND ISCN.TR
PROCESS RUN FILE RECORDS: HEADER STANDARDS UNKNOWNS SPIKES DUPLICATES CONTROL STDS. REAGENT BLKS. QC LIMITS
WRITE DATA TO ISCN.ID, ISCN.DF
RUN FILE ERROR
GENERATE/OUTPUT ERROR LIST (ISCN.LE)
ISCN.00
GENERATE/OUTPUT WHEEL PATTERN (ISCN.LW)
WRITE DATA TO ISCN.TR
ISCN.02

Figure 4. Program ISCN.01 -- Run File translator/wheel pattern generator.

TABLE 3. SYMBOL DEFINITIONS FOR ISCN.01

A1	the default Run File existence flag
A1$	the user's response to the Run File name prompt
B0	the instrument blank sample counter
D0$	the Run File data code
D1(	the sample data array
D2(	the data array of a sample being pointed to by D1(2)
E(	the error flag array for Run File record errors
E0	the Run File translation error counter
E1	the value transformation error flag
F0	the LCT/LSA record follower flag
F0$	the name of the sample identifier file
F1	the header record recognition flag
F1$	the name of the sample data file
F2$	the name of the transfer file
F3	the QC limit record expectation flag
F3$	the name given to printable sequential list files
F5$	the name of the calibration plot file
F7$	the name of the Run File being translated
I	a counter
I$	the contents of a sequential file record
I0$	the record delimiter in sequential file records
I1$	the sample identifier string
I2$	the sample identifier of the original QC member
I3$	the temporary string holding the sample identifier
J1	the QC limit locator for the sample data array (D1)
J2	the array locator for the number of QC records (L(J2))
K	a counter
L$	the QC code master string
L1	a counter for QC records
L(	the QC limit record numbering array
M5	the output mode flag
O$	the output option string
O1	the position locator in the output option string
O1$	the user's response to the output option prompt
P$	the overall system name and program prefix
P0$	the name of the ASCL program
P1$	the name of the translator program
P2$	the name of the pre-RUN input program
Q$	the master QC limit
Q0	the QC sample counter
Q1	the QC limit record counter
Q2(	the array counter for the five types of QC samples
Q3	the primary QC member expectation flag

TABLE 3 (Contd.)

R$	the name of the default Run File
R0	the Run File record counter
R0$	the PARMETH code string in the RF header record
R1$	the analyst's initials taken from the RF header record
R3$	the SFCRECNO field in an RF record
S$	the instrument directory name
S0	the calibration standard counter
S0$	the super string holding sample descriptors
S9	the position after the last calibration standard
T0	the timing set standard counter
U0	the unknown sample counter
V0	the value of a string (V0$)
V0$	the string passed to the value subroutine
W0	the wheel position counter
W1	the wheel position of the current sample
W2	the wheel position of the primary (previous) QC sample
Y0	the concentration of the lowest calibartion standard
Y9	the concentration of the highest calibration standard

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  1
                    PROGRAM LISTING FOR ISCN01.AS

123456789112345678921234567893123456789412345678951234567896123456789 7
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.01 - TRANSLATES RUN FILE, CREATES DATA    *
0040 REM *            FILES, AND CHAINS ISCN.02                      *
0050 REM *   BY: D.RYAN (UCCC), JULY 1, 1979                         *
0060 REM *   MOST RECENT REVISION: FEBRUARY 27, 1980                 *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 ON ESC THEN GOTO 3330
0090 ESC
0100 DIM D1[25],D2[25],E[200],Q2[5],L[5],Q1$[30],L$[20]
0110 DIM I$[80],I1$[15],I2$[15],I3$[15],V0$[10],Q$[20],F7$[13]
0120 DIM F0$[11],F1$[10],F2$[10],F3$[10],P$[10],R$[10],S0$[150]
0130 DIM D0$[20],A1$[13]
0140 CLOSE
0150 LET Q1$="UCLUWLAVELWLLCLA  B  C  D  "
0160 LET L$="LSOLCMLRBLD1LDX"
0170 LET L[1]=5
0180 LET L[2]=5
0190 LET L[3]=5
0200 LET L[4]=4
0210 LET L[5]=9
0220 LET W1=0
0230 LET R0=0
0240 LET F0=0
0250 LET E0=0
0260 LET U0=0
0270 LET F1=0
0280 LET S0=0
0290 LET T0=0
0300 LET B0=0
0310 LET Y0=1E+50
0320 LET Y9=-1E+50
0330 LET Q1=0
0340 LET O$="HTLBN"
0350 LET Q$="LSPKLRBLLDUPLCST"
0360 LET S0$="TIMING SET STD  INSTR CAL STD UNKNOWN SAMPLE    SPIKE  0
*    F   "
0370 LET S0$=S0$,"   CHECK  OF     DUPLICATE  OF  LAB CNTRL STD "
0380 LET S0$=S0$," REAGENT BLANK  SURROGATE SPK   INSTR BLANK   "
0390 MAT D1=ZER
0400 MAT D2=ZER
0410 MAT Q2=ZER

123456789112345678921234567893123456789412345678951234567896123456789 7
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  2
                    PROGRAM LISTING FOR ISCN01.AS

123456789112345678921234567893123456789412345678951234567896123456789 7
         0         0         0         0         0         0         0
0420 MAT E=ZER
0430 ON ERR THEN GOTO 3330
0440 OPEN FILE[6,3],"INST.NM"
0450 LREAD FILE[6],S$
0460 CLOSE FILE[6]
0470 ON ERR THEN STOP
0480 LET P$="ISCN"
0490 LET P0$=P$,".00"
0500 LET P1$=P$,".01"
0510 LET P2$=P$,".02"
0520 LET F0$=P$,".ID"
0530 LET F1$=P$,".DF"
0540 LET F2$=P$,".TR"
0550 ON ERR THEN GOTO 0570
0560 RENAME F2$,F2$
0570 ON ERR THEN STOP
0580 IF SYS(7)=-9 THEN GOTO 0810
0590 OPEN FILE[2,0],F2$
0600 WRITE FILE[2,0],115,110,100,90,85,1,0,0,0,0
0610 WRITE FILE[2,1],"","","","","","",""
0620 WRITE FILE[2,2],0,0,0,0,0,0,0,0,0,0
0630 WRITE FILE[2,3],0,0,0,0,0,0,0,0,0,0
0640 WRITE FILE[2,4],"",1,0,0,-1E+51,1E+51,0,"",""
0650 WRITE FILE[2,5],0,0,0,0,0,0,0,0,0,0
0660 WRITE FILE[2,6],0,0,0,0,0,0,0,0,0,0
0670 WRITE FILE[2,7],0,0,0,0,0,0,0,0,0,0
0680 WRITE FILE[2,8],0,0,0,0,0,0,0,0,0,0
0690 WRITE FILE[2,9],"NMN","AN","UNITS","INSTRUMENT"
0700 WRITE FILE[2,10],"COMMENT #1"
0710 WRITE FILE[2,11],"COMMENT #2"
0720 WRITE FILE[2,12],"COMMENT #3"
0730 WRITE FILE[2,13],"COMMENT #4"
0740 WRITE FILE[2,14],"COMMENT #5"
0750 WRITE FILE[2,15],0,0,0,0,0,0,0,0,0,0
0760 WRITE FILE[2,16],0,0,0,0,0,0,0,0,0,0
0770 WRITE FILE[2,17],0,0,0,0,0,0,0,0,0,0
0780 WRITE FILE[2,18],0,0,0,0,0,0,0,0,0,0
0790 WRITE FILE[2,19],0,0,0,0,0,0,0,0,0,0
0800 CLOSE FILE[2]
0810 LET A1$=""
0820 LET F5$=P$,".PT"
0830 ON ERR THEN GOTO 0850

123456789112345678921234567893123456789412345678951234567896123456789 7
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN01.AS

```
12345678911234567892123456789312345678941234567895123456789612345678970
        0         0         0         0         0         0         0
0840 DELETE F5$
0850 ON ERR THEN GOTO 0880
0860 LET R$="0000000.RF"
0870 RENAME R$,R$
0880 ON ERR THEN STOP
0890 LET A1=0
0900 IF SYS(7)=-9 THEN LET A1=1
0910 PRINT
0920 PRINT "WHAT IS THE RUN FILE NAME ";
0930 IF A1=1 THEN PRINT "[0000000.RF]";
0940 ON ERR THEN GOTO 4540
0950 INPUT " > ",A1$;
0960 ON ERR THEN STOP
0970 PRINT
0980 IF LEN(A1$)=0 THEN IF A1=1 THEN LET A1$=R$
0990 IF LEN(A1$)>0 THEN GOTO 1020
1000 PRINT "<7>";
1010 GOTO 0910
1020 IF A1$[LEN(A1$)-2]=".RF" THEN GOTO 1050
1030 IF A1$[LEN(A1$)-2]=".RR" THEN GOTO 1050
1040 LET A1$=A1$,".RF"
1050 ON ERR THEN GOTO 1070
1060 RENAME A1$,A1$
1070 ON ERR THEN STOP
1080 IF SYS(7)=-9 THEN GOTO 1120
1090 PRINT
1100 PRINT "<7>INVALID RUN FILE NAME!<7>"
1110 GOTO 0910
1120 LET F7$=A1$
1130 PRINT
1140 PRINT "RUN FILE TRANSLATOR BEGINS (";S$;")"
1150 OPEN FILE[0,0],F0$,20
1160 OPEN FILE[7,3],F7$,80
1170 OPEN FILE[1,0],F1$
1180 OPEN FILE[2,0],F2$
1190 GOTO 1250
1200 LET E0=E0+1
1210 PRINT I$[1,65];" ERROR"
1220 LET E[R0]=1
1230 GOTO 3010
1240 GOSUB 3870
1250 LREAD FILE[7],I$

12345678911234567892123456789312345678941234567895123456789612345678970
        0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN01.AS

```
12345678911234567892123456789312345678941234567895123456789612345678970
        0         0         0         0         0         0         0
1260 IF EOF(7)=1 THEN GOTO 3010
1270 IF I$[1,1]="4" THEN GOTO 1570
1280 LET I1$=I$[1,15]
1290 LET R0=R0+1
1300 IF I$[1,1]<>"1" THEN GOTO 1440
1310 IF F1=1 THEN GOTO 1200
1320 LET F1=1
1330 LET D0$=I$[3,16]
1340 FOR K=1 TO LEN(D0$)
1350   IF D0$[K,K]=" " THEN LET D0$[K,K]="0"
1360 NEXT K
1370 LET D0$[3,3]="/"
1380 LET D0$[6,6]="/"
1390 LET D0$[9,9]=" "
1400 LET D0$[12,12]=":"
1410 LET R0$=I$[24,30]
1420 LET R1$=I$[32,34]
1430 GOTO 1250
1440 IF I$[1,1]<>"2" THEN GOTO 1470
1450 IF I$[12,14]<>"LCT" THEN IF I$[12,14]<>"LSA" THEN GOTO 1470
1460 GOTO 2820
1470 IF F0=1 THEN GOTO 1200
1480 LET W1=W1+1
1490 MAT D1=ZER
1500 LET D1[1]=R0
1510 LET D1[4]=1
1520 IF I$[1,1]="3" THEN GOTO 2410
1530 IF I$[1,1]="2" THEN GOTO 1830
1540 GOTO 1200
1550 REM [     PROCESS 4 TYPE RECORDS      ]
1560 REM ==================================
1570 LET Q1=Q1+1
1580 LET R0=R0+1
1590 IF F3<>1 THEN GOTO 1200
1600 LET J2=POS(L$,I1$[12,14],1)
1610 LET J2=(J2-1)/3+1
1620 IF J2>=1 THEN IF J2<=5 THEN GOTO 1640
1630 GOTO 1200
1640 FOR L1=1 TO L[J2]
1650   IF L1=1 THEN GOTO 1700
1660   LREAD FILE[7],I$
1670   IF EOF(7)=1 THEN GOTO 3010

12345678911234567892123456789312345678941234567895123456789612345678970
        0         0         0         0         0         0         0
```

TYPING GUIDE SHEET

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  5
                     PROGRAM LISTING FOR ISCN01.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1680   LET Q1=Q1+1
1690   LET R0=R0+1
1700   LET J1=POS(Q1$,I$[12,14],1)
1710   LET J1=(J1-1)/3+1
1720    IF J1>0 THEN IF J1<=9 THEN GOTO 1740
1730   GOTO 1200
1740   LET V0$=I$[28,37]
1750   GOSUB 3950
1760    IF E1=1 THEN GOTO 1200
1770   LET D1[J1+13]=V0
1780 NEXT L1
1790 LET F3=0
1800 GOTO 1240
1810 REM [      PROCESS 2 TYPE RECORDS       ]
1820 REM ==================================
1830 IF I$[12,14]<>"LCM" THEN GOTO 1870
1840 LET Q2[4]=Q2[4]+1
1850 LET D1[3]=6
1860 GOTO 2190
1870 IF I$[12,14]<>"LRB" THEN GOTO 1920
1880 LET F3=1
1890 LET Q2[2]=Q2[2]+1
1900 LET D1[3]=7
1910 GOTO 1240
1920 IF I$[12,14]<>"   " THEN GOTO 1970
1930 LET D1[3]=2
1940 LET U0=U0+1
1950 LET R3$=I$[39,46]
1960 GOTO 1240
1970 IF I$[12,14]<>"LD1" THEN GOTO 2010
1980 LET D1[2]=-1
1990 LET F3=1
2000 GOTO 1930
2010 IF I$[12,14]<>"LS0" THEN GOTO 2030
2020 GOTO 1980
2030 IF I$[12,14]<>"LDX" THEN GOTO 2050
2040 GOTO 1980
2050 IF I$[12,14]<>"LSF" THEN GOTO 2220
2060 LET Q2[1]=Q2[1]+1
2070 LET D1[3]=3
2080 LET Q3=0
2090 LET W2=W1

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  6
                     PROGRAM LISTING FOR ISCN01.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2100 LET W2=W2-1
2110 IF W2<1 THEN GOTO 2180
2120 GOSUB 3840
2130 IF I1$[3,10]=I2$[3,10] THEN IF D2[3]=2 THEN GOTO 2150
2140 GOTO 2100
2150 LET D1[2]=W2
2160 LET Q3=1
2170 GOSUB 3870
2180 IF Q3=0 THEN GOTO 1200
2190 LET I3$=I1$
2200 LET F0=1
2210 GOTO 1240
2220 IF I$[12,13]<>"LD" THEN GOTO 2240
2230 IF I$[14,14]>"1" THEN IF I$[14,14]<="9" THEN GOTO 2250
2240 GOTO 1200
2250 LET Q2[3]=Q2[3]+1
2260 LET D1[3]=5
2270 LET Q3=0
2280 LET W2=W1
2290 LET W2=W2-1
2300 IF W2<1 THEN GOTO 2370
2310 GOSUB 3840
2320 IF I1$[3,10]=I2$[3,10] THEN IF D2[3]=2 THEN GOTO 2340
2330 GOTO 2290
2340 LET D1[2]=W2
2350 LET Q3=1
2360 GOSUB 3870
2370 IF Q3=0 THEN GOTO 1200
2380 GOTO 1240
2390 REM [      PROCESS 3 TYPE RECORDS       ]
2400 REM ==================================
2410 IF I$[39,39]<>"T" THEN GOTO 2440
2420 LET T0=T0+1
2430 GOTO 1240
2440 IF I$[39,39]<>"B" THEN GOTO 2480
2450 LET B0=B0+1
2460 LET D1[3]=9
2470 GOTO 1240
2480 IF I$[39,39]<>"S" THEN GOTO 2590
2490 LET S9=W1
2500 LET S0=S0+1
2510 LET D1[3]=1

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2520 LET V0$=I$[5,14]
2530 GOSUB 3950
2540 IF E1=1 THEN GOTO 1200
2550 IF V0>Y9 THEN LET Y9=V0
2560 IF V0<Y0 THEN LET Y0=V0
2570 LET D1[5]=V0
2580 GOTO 1240
2590 IF I$[39,40]<>"CS" THEN GOTO 1200
2600 LET Q2[5]=Q2[5]+1
2610 LET D1[3]=4
2620 LET V0$=I$[5,14]
2630 GOSUB 3950
2640 LET D1[5]=V0
2650 LET Q3=0
2660 LET W2=0
2670 LET W2=W2+1
2680 IF W2>=W1 THEN GOTO 2770
2690 GOSUB 3840
2700 IF D1[5]=D2[5] THEN GOTO 2720
2710 GOTO 2670
2720 LET D2[2]=-1
2730 GOSUB 3900
2740 LET D1[2]=W2
2750 LET Q3=1
2760 GOSUB 3870
2770 IF Q3=0 THEN GOTO 1200
2780 IF E1=1 THEN GOTO 1200
2790 GOTO 1240
2800 REM [      PROCESS 2+ TYPE RECORDS      ]
2810 REM ================================
2820 IF F0<>1 THEN GOTO 1200
2830 LET F0=0
2840 IF I$[12,14]<>"LCT" THEN GOTO 2940
2850 IF D1[3]<>6 THEN GOTO 1200
2860 LET F3=1
2870 LET V0$=I$[28,37]
2880 GOSUB 3950
2890 LET D1[5]=V0
2900 LET D1[4]=0
2910 LET I1$=I3$
2920 IF E1=1 THEN GOTO 1200
2930 GOTO 1240

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2940 IF I$[12,14]<>"LSA" THEN GOTO 1200
2950 IF D1[3]<>3 THEN GOTO 1200
2960 LET D1[4]=0
2970 LET I1$=I3$
2980 GOTO 1240
2990 REM [     ERROR LIST AND EXIT              ]
3000 REM =====================================
3010 PRINT
3020 PRINT "TRANSLATION COMPLETE."
3030 LET W0=W1
3040 LET Q0=0
3050 FOR I=1 TO 5
3060   LET Q0=Q0+Q2[I]
3070 NEXT I
3080 CLOSE FILE[7]
3090 IF F1=1 THEN IF S0>0 THEN GOTO 3110
3100 GOTO 3120
3110 IF E0=0 THEN GOTO 3450
3120 PRINT
3130 PRINT "<7>RUN FILE ";F7$;" HAS AN ERROR!<7>"
3140 OPEN FILE[7,3],F7$,80
3150 LET F3$=P$,".LE"
3160 OPEN FILE[3,1],F3$,80
3170 PRINT FILE[3]
3180 PRINT FILE[3],"RUN FILE ERROR LIST FOR ";F7$;"      ";SYS(11);":"
*    ;SYS(12);"   ";SYS(2);"/";SYS(1);"/";SYS(3)
3190 PRINT FILE[3]
3200 FOR I=1 TO 1000
3210   LREAD FILE[7],I$
3220   IF EOF(7)=1 THEN GOTO 3280
3230   IF E[I]=0 THEN GOTO 3260
3240   PRINT FILE[3],"ERROR ";I$[1,65]
3250   GOTO 3270
3260   PRINT FILE[3],"OK    ";I$[1,65]
3270 NEXT I
3280 CLOSE FILE[3]
3290 CLOSE FILE[7]
3300 PRINT
3310 PRINT "ERROR LIST ";
3320 GOSUB 4050
3330 NOESC
3340 CLOSE

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                       PAGE  9
                      PROGRAM LISTING FOR ISCN01.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3350 PRINT
3360 PRINT
3370 PRINT "UNSCHEDULED EXIT TO AUTOMATION COMMAND LEVEL."
3380 ON ERR THEN GOTO 3400
3390 CHAIN P0$
3400 ON ERR THEN GOTO 3420
3410 CHAIN "INITIALIZE"
3420 BYE
3430 REM [    OUTPUT WHEEL PATTERN          ]
3440 REM =====================================
3450 PRINT
3460 PRINT "RUN FILE CHECKS OK!"
3470 PRINT
3480 LET F3$=P$,".LW"
3490 OPEN FILE[3,1],F3$,80
3500 PRINT FILE[3]
3510 PRINT FILE[3],"WHEEL PATTERN FOR RUN FILE ";F7$;"    ";SYS(11);":"
*        ;SYS(12);"  ";SYS(2);"/";SYS(1);"/";SYS(3)
3520 PRINT FILE[3]
3530 FOR W1=1 TO W0
3540   GOSUB 3810
3550   PRINT FILE[3],USING "WHEEL POS ### ",W1;
3560   PRINT FILE[3],"/";I1$;"/";S0$[D1[3]*15+1,(D1[3]+1)*15];
3570   LET W2=D1[2]
3580   IF W2>=1 THEN IF W2<W1 THEN GOTO 3620
3590   IF W2<>-1 THEN GOTO 3650
3600   PRINT FILE[3]," (HAS QC)";
3610   GOTO 3650
3620   GOSUB 3840
3630   PRINT FILE[3],S0$[D2[3]*15+1,(D2[3]+1)*15];
3640   PRINT FILE[3],USING " IN POS ###",W2;
3650   PRINT FILE[3]
3660 NEXT W1
3670 PRINT FILE[3]
3680 CLOSE FILE[3]
3690 PRINT "WHEEL PATTERN ";
3700 GOSUB 4050
3710 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
3720 WRITE FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9+1
3730 WRITE FILE[2,3],Q2[1],Q2[2],Q2[3],Q2[4],Q2[5],Q0,Q1
3740 NOESC
3750 ON ERR THEN GOTO 3770

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                       PAGE 10
                      PROGRAM LISTING FOR ISCN01.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3760 CHAIN P2$
3770 ON ERR THEN STOP
3780 GOTO 3330
3790 REM [  READ/WRITE (.DF) SUBROUTINES   ]
3800 REM ***********************************
3810 MAT READ FILE[1,W1],D1
3820 READ FILE[0,W1],I1$
3830 RETURN
3840 MAT READ FILE[1,W2],D2
3850 READ FILE[0,W2],I2$
3860 RETURN
3870 MAT WRITE FILE[1,W1],D1
3880 WRITE FILE[0,W1],I1$
3890 RETURN
3900 MAT WRITE FILE[1,W2],D2
3910 WRITE FILE[0,W2],I2$
3920 RETURN
3930 REM [ SUBROUTINE TO GET VALUE         ]
3940 REM ***********************************
3950 LET E1=0
3960 LET V0=0
3970 ON ERR THEN GOTO 4000
3980 LET V0=VAL(V0$)
3990 GOTO 4010
4000 LET E1=1
4010 ON ERR THEN STOP
4020 RETURN
4030 REM [      PRINT  SUBROUTINE          ]
4040 REM ***********************************
4050 ON ESC THEN GOTO 4190
4060 ESC
4070 PRINT
4080 PRINT "OUTPUT OPTIONS: ([H]TLBN) ";
4090 ON ERR THEN GOTO 4540
4100 INPUT " > ",O1$;
4110 ON ERR THEN STOP
4120 PRINT
4130 IF O1$<>"H" THEN IF LEN(O1$)<>0 THEN GOTO 4150
4140 GOTO 4190
4150 LET O1=POS(O$,O1$,1)
4160 IF O1>1 THEN GOTO 4250
4170 PRINT "<7>";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                    PROGRAM LISTING FOR ISCN01.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4180 GOTO 4050
4190 PRINT "    T - TERMINAL OUTPUT ONLY"
4200 PRINT "    L - LINEPRINTER OUTPUT ONLY"
4210 PRINT "    B - TERMINAL AND LINEPRINTER OUTPUT"
4220 PRINT "    N - NO REPORT GENERATED"
4230 PRINT
4240 GOTO 4050
4250 LET M5=01-2
4260 IF M5=3 THEN GOTO 4510
4270 IF M5=0 THEN GOTO 4440
4280 OPEN FILE[3,3],F3$,80
4290 GOTO 4320
4300 IF SYS(7)<>-48 THEN STOP
4310 DELAY =2.3
4320 ON ERR THEN GOTO 4300
4330 OPEN FILE[6,1],"$LPT"
4340 ON ERR THEN STOP
4350 FOR I=1 TO 1000
4360   LREAD FILE[3],I$,IO$
4370   IF EOF(3)=1 THEN GOTO 4410
4380   LET I$=I$,IO$
4390   PRINT FILE[6],I$;
4400 NEXT I
4410 CLOSE FILE[6]
4420 CLOSE FILE[3]
4430 IF M5=1 THEN GOTO 4510
4440 OPEN FILE[3,3],F3$,80
4450 FOR I=1 TO 1000
4460   LREAD FILE[3],I$,IO$
4470   IF EOF(3)=1 THEN GOTO 4500
4480   PRINT I$;IO$;
4490 NEXT I
4500 CLOSE FILE[3]
4510 RETURN
4520 REM [   ERROR/RETRY  SEGMENT         ]
4530 REM ++++++++++++++++++++++++++++++++++
4540 PRINT "<7> ";
4550 RETRY




1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE 12
                    SYMBOL TABLE FOR ISCN01.AS

SYMBOL    REFERENCES
------    ------------------------------------------------------------
0570  0550
0810  0580
0850  0830
0880  0850
0910  1010  1110
1020  0990
1050  1020  1030
1070  1050
1120  1080
1200  1310  1470  1540  1590  1630  1730  1760  2180  2240  2370
      2540  2590  2770  2780  2820  2850  2920  2940  2950
1240  1800  1910  1960  2210  2380  2430  2470  2580  2790  2930
      2980
1250  1190  1430
1440  1300
1470  1440  1450
1570  1270
1640  1620
1700  1650
1740  1720
1830  1530
1870  1830
1920  1870
1930  2000
1970  1920
1980  2020  2040
2010  1970
2030  2010
2050  2030
2100  2140
2150  2130
2180  2110
2190  1860
2220  2050
2240  2220
2250  2230
2290  2330
2340  2320
2370  2300
2410  1520
2440  2410
2480  2440
2590  2480
2670  2710
2720  2700
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE 13
                   SYMBOL TABLE FOR ISCN01.AS

SYMBOL   REFERENCES
------   ---------------------------------------------------------------
 2770    2680
 2820    1460
 2940    2840
 3010    1230  1260  1670
 3110    3090
 3120    3100
 3260    3230
 3270    3250
 3280    3220
 3330    0080  0430  3780
 3400    3380
 3420    3400
 3450    3110
 3620    3580
 3650    3590  3610
 3770    3750
 3810    3540
 3840    2120  2310  2690  3620
 3870    1240  2170  2360  2760
 3900    2730
 3950    1750  2530  2630  2880
 4000    3970
 4010    3990
 4050    3320  3700  4180  4240
 4150    4130
 4190    4050  4140
 4250    4160
 4300    4320
 4320    4290
 4410    4370
 4440    4270
 4500    4470
 4510    4260  4430
 4540    0940  4090
 A1      0890  0900  0930  0980
 A1$     0130  0810  0950  0980  0990  1020  1030  1040  1060  1120
 B0      0300  2450  3720
 D0$     0130  1330  1340  1350  1370  1380  1390  1400  3710
 D1      0390  1490  3810  3870
 D1[     0100  1500  1510  1770  1850  1900  1930  1980  2070  2150
         2260  2340  2460  2510  2570  2610  2640  2700  2740  2850
         2890  2900  2950  2960  3560  3570
 D2      0400  3840  3900
 D2[     0100  2130  2320  2700  2720  3630
 E       0420
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE 14
                   SYMBOL TABLE FOR ISCN01.AS

SYMBOL   REFERENCES
------   ---------------------------------------------------------------
 E0      0250  1200  3110
 E1      1760  2540  2780  2920  3950  4000
 E[      0100  1220  3230
 F0      0240  1470  2200  2820  2830
 F0$     0120  0520  1150
 F1      0270  1310  1320  3090
 F1$     0120  0530  1170
 F2$     0120  0540  0560  0590  1180
 F3      1590  1790  1880  1990  2860
 F3$     0120  3150  3160  3480  3490  4280  4440
 F5$     0820  0840
 F7$     0110  1120  1160  3130  3140  3180  3510  3710
 FL#0    1150  3820  3850  3880  3910
 FL#1    1170  3810  3840  3870  3900
 FL#2    0590  0600  0610  0620  0630  0640  0650  0660  0670  0680
         0690  0700  0710  0720  0730  0740  0750  0760  0770  0780
         0790  0800  1180  3710  3720  3730
 FL#3    3160  3170  3180  3190  3240  3260  3280  3490  3500  3510
         3520  3550  3560  3600  3630  3640  3650  3670  3680  4280
         4360  4420  4440  4460  4500
 FL#6    0440  0450  0460  4330  4390  4410
 FL#7    1160  1250  1660  3080  3140  3210  3290
 I       3050  3060  3070  3200  3230  3270  4350  4400  4450  4490
 I$      0110  1210  1250  1270  1280  1300  1330  1410  1420  1440
         1450  1520  1530  1660  1700  1740  1830  1870  1920  1950
         1970  2010  2030  2050  2220  2230  2410  2440  2480  2520
         2590  2620  2840  2870  2940  3210  3240  3260  4360  4380
         4390  4460  4480
 I0$     4360  4380  4460  4480
 I1$     0110  1280  1600  2130  2190  2320  2910  2970  3560  3820
         3880
 I2$     0110  2130  2320  3850  3910
 I3$     0110  2190  2910  2970
 J1      1700  1710  1720  1770
 J2      1600  1610  1620  1640
 K       1340  1350  1360
 L$      0100  0160  1600
 L1      1640  1650  1780
 L[      0100  0170  0180  0190  0200  0210  1640
 M5      4250  4260  4270  4430
 O$      0340  4150
 O1      4150  4160  4250
 O1$     4100  4130  4150
 P$      0120  0480  0490  0500  0510  0520  0530  0540  0820  3150
         3480  3710
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                        SYMBOL TABLE FOR ISCN01.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------
 P0$    0490  3390  3710
 P1$    0500  3710
 P2$    0510  3710  3760
 Q$     0110  0350
 Q0     3040  3060  3730
 Q1     0330  1570  1680  3730
 Q1$    0100  0150  1700
 Q2     0410
 Q2[    0100  1840  1890  2060  2250  2600  3060  3730
 Q3     2080  2160  2180  2270  2350  2370  2650  2750  2770
 R$     0120  0860  0870  0980
 R0     0230  1220  1290  1500  1580  1690  3720
 R0$    1410  3710
 R1$    1420
 R3$    1950
 S$     0450  1140
 S0     0280  2500  3090  3720
 S0$    0120  0360  0370  0380  3560  3630
 S9     2490  3720
 T0     0290  2420  3720
 U0     0260  1940  3720
 V0     1770  2550  2560  2570  2640  2890  3960  3980
 V0$    0110  1740  2520  2620  2870  3980
 W0     3030  3530  3720
 W1     0220  1480  2090  2280  2490  2680  3030  3530  3550  3580
        3660  3810  3820  3870  3880
 W2     2090  2100  2110  2150  2280  2290  2300  2340  2660  2670
        2680  2740  3570  3580  3590  3640  3840  3850  3900  3910
 Y0     0310  2560  3720
 Y9     0320  2550  3720
```

SECTION 5

ISCN.02 - THE PRE-RUN PARAMETER DEFINITION MODULE

All RUN information which is not available through the translation of the Run File must be supplied by the analyst prior to a RUN. These parameters include descriptive strings, spiked sample parameters, preliminary dilution volumes, check standard QC limits and preliminary RUN modes. The ISCN.02 program facilitates the input of these parameters. (See Figure 5.) A full pass through each of the five input modules is required prior to every new RUN except in the cases where there are either no spikes or no check standards present in the previously translated Run File.

Wherever possible, the ISCN.02 program uses the carriage return default technique for the parameter being asked for. Usually the analyst's last used response to the prompt will be the assumed answer to the current prompt. In the case of volume, concentration or mass inputs the program will first default to zero until the analyst inputs a value other than zero to describe a parameter. This value will then be remembered and used as a default in subsequent input sessions requiring a similar parameter.

The spiked sample parameter entry routine is complicated because of the storage positions of the essential parameters. The definition of a spike requires the complete revelation of original and dilution volumes as well as spike volume and concentration. The program stores the dilution parameters in the D2(4) and D2(5) array positions of the original member (LSO). The spike volume and concentration parameters are stored in D1(4) and D1(5) of the secondary member (LSF). This allows for multiple spiking of the same original and for successive dilutions on an unknown.

The dilution volume input module is somewhat complex because of the large number of options available to the analyst. During the actual dilution volume update, a search is made for all secondary QC samples associated with the diluted sample, and a message is generated indicating that it too is subject to the same dilution criterion. In fact, however, the dilution information is only valuable in the data array of the primary QC sample member. If the program were to write diultion volumes into the secondary spike fields, it would write over other essential spike data.

The initial RUN-modes defining concentration computation, sequencing, data access, and report output are defined by the analyst prior to a RUN. The default for these parameters are those used the last time a RUN was made. They are stored in ISCN.TR in record #0. After a RUN begins, these modes may be modified by the analyst or may be automatically adjusted by the computer. These changes will affect the RUN-modes stored in record #15 of ISCN.TR but will have no affect on the initial RUN-modes stored in record #0.

One aspect of this module checks the computational mode and provides additional screening when a particular configuration of calibration standards is perceived. If the number of standards is insufficient to support the selected equation, an error message is generated and the analyst is asked to select a new mode. In addition, under certain conditions, the analyst is asked to specify the position in the wheel after which calibration should occur. This is done primarily for analysts who place standards at the beginning and the end of the wheel pattern, however, other similar configurations could trigger this prompt.

The escape mechanism in this program allows the analyst to restart the program or quit. The restart is accomplished with a CHAIN to ISCN.02 -- that is the program CHAINS itself. No files are damaged in the process and the parameters are initialized with no trouble. Quitting the pre-RUN input module forces an exit to ISCN.00 which immediately closes all files.

Two normal exit routes are available to this program. If data is to be entered manually from the keyboard then a CHAIN is made directly to ISCN.04. If, however, an automated instrument is being used to access sample data, the ISCN.02 program will CHAIN to the ISCN.03 program in order to give the analyst the opportunity to test the instrument and related interface equipment.

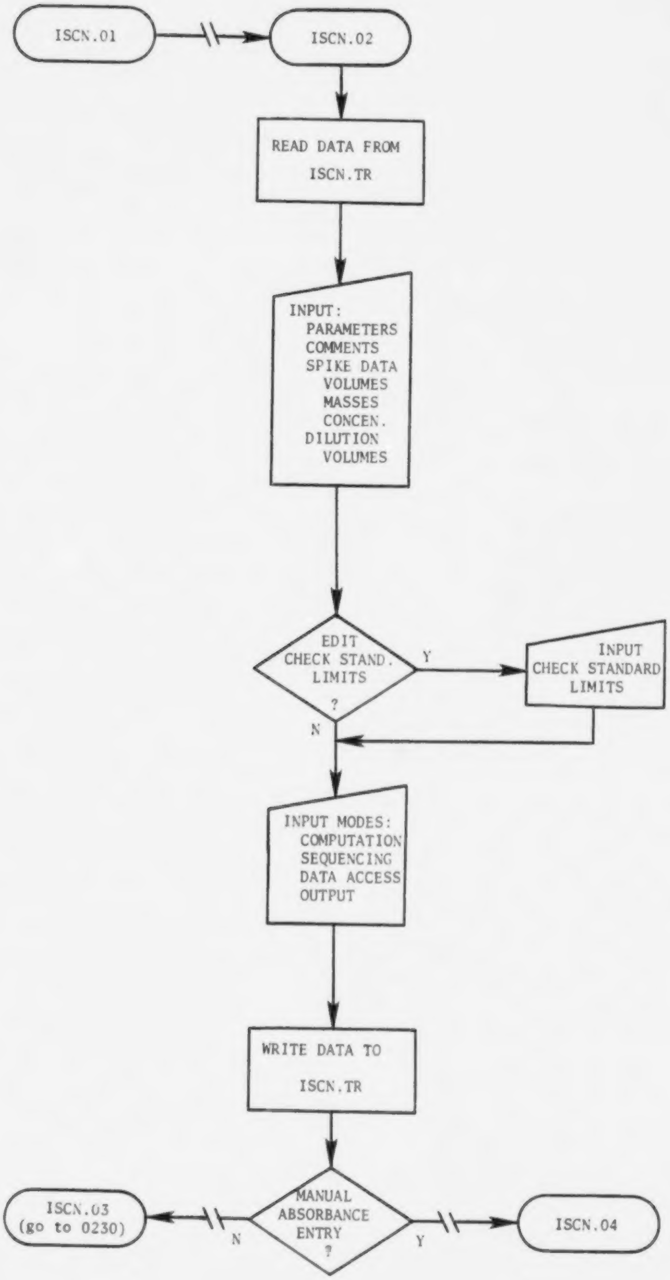
ISCN.01
ISCN.02
READ DATA FROM ISCN.TR
INPUT: PARAMETERS COMMENTS SPIKE DATA VOLUMES MASSES CONCEN. DILUTION VOLUMES
EDIT CHECK STAND. LIMITS ?
Y
INPUT CHECK STANDARD LIMITS
N
INPUT MODES: COMPUTATION SEQUENCING DATA ACCESS OUTPUT
WRITE DATA TO ISCN.TR
MANUAL ABSORBANCE ENTRY ?
N
ISCN.03 (go to 0230)
Y
ISCN.04

Figure 5. Program ISCN.02 -- Pre-Run input module.

TABLE 4. SYMBOL DEFINITIONS FOR ISCN.02

A	a string locator
A$	a user response to a prompt
A1$	a default string
A2$	a user response to a prompt
A3$	a default string
A4$	a user response to a prompt
A5$	a default string
A6$	a user response to a prompt
A7$	a default string
A8$	a default string
B0	the number of instrument blanks in the wheel pattern
D0$	the Run File date code
D1(	the data array for the current sample
D2(	the data array for a previous (primary) QC member
F2$	the name of the system transfer file
F7$	the name of the Run File
I	a general purpose counter
I1$	the identifier string for the current sample
I2$	the identifier string for the previous (primary) QC member
J	a counter
K	a counter
M0	the computational mode flag
M1	the sequencing mode flag
M2	the data acquisition mode flag
M4	the dilution option flag
M4$	the dilution option string
M5	the output option flag
P$	the program an file prefix string
P0$	the name of the previous program (.01)
P1$	the name of the current program (.02)
P2$	the name of the next program (.03)
P3$	the name of the ASCL program (.00)
P4$	the name of the IRCL program (.04)
Q2(	the QC sample counter
Q(	the check standard quality control limit array
R0	the number of reagent blanks in the wheel pattern
R04	the generic PARMETH code for the Run File
R1	the number of replicate measurements made for each sample
R1$	the string containing the analyst's initials
R2$	the string containing the analyte being measured
R3$	the string containing the units of measure
R4$	the string containing the instrument name
S0	the number of calibration standards in a wheel pattern

TABLE 4 (Contd.)

S0$	the computation mode identifier super-string
S1$	the sequencing mode identifier super-string
S2$	the output mode identifier super-string
S8	the user-supplied calibration position
S9	the position after which calibration is to be performed
T0	the number of timing standards in the wheel pattern
U0	the number of unknowns in the wheel pattern
V	the numerical value of a string-input (general)
V5	the volume of a spike
V6	the concentration or mass of a spike
V7	the original sample volume
V7$	a user response to a prompt
V8	the volume of added dilution solution
V8$	a user response to a prompt
V9	the displayed dilution factor
W0	the number of wheel positions in wheel pattern
W1	the current wheel position
W2	the position of previous (primary) QC member
Y0	the lowest calibration standard concentration
Y9	the highest calibration standard concentration

```
         STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                       PAGE  1
                       PROGRAM LISTING FOR ISCN02.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.02 - DEFINE PRE-RUN PARAMETERS AND        *
0040 REM *             CHECK STANDARD CONTROL LIMITS.                *
0050 REM *   BY: D.RYAN (UCCC), NOVEMBER 14, 1979                    *
0060 REM *   MOST RECENT REVISION: DECEMBER 26, 1979                 *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 DIM D1[25],D2[25],Q[5],Q2[5]
0090 DIM R1$[4],R2$[2],R3$[8],R4$[16],A$[80],A1$[80]
0110 DIM I1$[15],I2$[15],Q1$[35],F7$[13],P$[10]
0130 DIM D0$[20],A2$[20],S0$[75],S1$[30],S2$[30],S5$[60]
0140 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0150 LET P0$=P$,".01"
0160 LET P1$=P$,".02"
0170 LET P2$=P$,".03"
0180 LET P3$=P$,".00"
0190 LET P4$=P$,".04"
0200 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0210 PRINT
0220 PRINT "BEGIN PRE-RUN INPUT SESSION."
0230 READ FILE[2,9],R1$,R2$,R3$,R4$
0240 ON ESC THEN GOTO 5570
0250 ESC
0270 READ FILE[2,0],Q[1],Q[2],Q[3],Q[4],Q[5],M0,M1,M2,M5,R1
0280 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0290 READ FILE[2,3],Q2[1],Q2[2],Q2[3],Q2[4],Q2[5],Q0,Q1
0300 PRINT
0310 PRINT "ANALYST'S INITIALS: ";
0320 LET A1$=R1$
0330 GOSUB 5480
0340 LET R1$=A1$
0350 PRINT "ANALYTE MEASURED:   ";
0360 LET A1$=R2$
0370 GOSUB 5480
0380 LET R2$=A1$
0390 PRINT "CONCENTRATION UNITS:";
0400 LET A1$=R3$
0410 GOSUB 5480
0420 LET R3$=A1$
0430 IF R3$<>"UG/L" THEN IF R3$<>"MG/L" THEN IF R3$<>"UG/KG" THEN IF R
*     3$<>"MG/KG" THEN GOTO 0450
0440 GOTO 0470

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         0         0         0         0         0         0         0
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         STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                       PAGE  2
                       PROGRAM LISTING FOR ISCN02.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0450 PRINT "<7>";
0460 GOTO 0390
0470 PRINT "INSTRUMENT NAME:    ";
0480 LET A1$=R4$
0490 GOSUB 5480
0500 LET R4$=A1$
0510 WRITE FILE[2,9],R1$,R2$,R3$,R4$
0520 PRINT
0530 PRINT "ENTER COMMENTS HERE:"
0540 PRINT "COMMENT                             ([COPY], X TO EXIT, OR TYPE NEW COMME
*     NT)"
0550 PRINT "NUMBER"
0560 FOR I=1 TO 5
0570   READ FILE[2,9+I],A1$
0580   PRINT USING "  #  >",I;
0590   IF LEN(A1$)=0 THEN GOTO 0620
0600   PRINT "[";A1$;"]"
0610   PRINT "     >";
0620   ON ERR THEN GOTO 5550
0630   INPUT "",A$;
0640   ON ERR THEN STOP
0650   PRINT
0660   IF LEN(A$)=0 THEN LET A$=A1$
0670   IF A$="X" THEN GOTO 0710
0680   WRITE FILE[2,9+I],A$
0690 NEXT I
0700 GOTO 0760
0710 FOR J=I TO 5
0720   WRITE FILE[2,9+J],""
0730 NEXT J
0740 REM [  SPIKE VOL/CONC OR MASS ENTRY  ]
0750 REM ********************************
0760 LET A1$="0"
0770 LET A3$="0"
0780 LET A5$="0"
0790 LET A7$="0"
0800 LET A8$="0"
0810 IF Q2[1]=0 THEN GOTO 1480
0820 PRINT
0830 ON ERR THEN GOTO 0930
0840 FOR W1=1 TO W0
0850   GOSUB 2480

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         0         0         0         0         0         0         0
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PROGRAM LISTING FOR ISCN02.AS

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1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0860   IF D1[3]<>3 THEN GOTO 1350
0870   PRINT
0880   PRINT USING "WHEEL POS ### ",W1;
0890   PRINT "/";I1$;"/ SPIKED UNKNOWN"
0900   PRINT "VOLUME OF SPIKE: [";A1$;"] ML ";
0910   ON ERR THEN GOTO 2620
0920   GOTO 0940
0930   PRINT "<7>";
0940   INPUT "> ",A2$;
0950   ON ERR THEN GOTO 0910
0960   IF LEN(A2$)=0 THEN LET A2$=A1$
0970   LET V5=VAL(A2$)
0980   LET V5=V5/1000
0990   ON ERR THEN STOP
1000   PRINT
1010   LET A1$=A2$
1020   IF V5=0 THEN GOTO 1150
1030   PRINT "CONC OF ADDED SPIKE: [";A3$;"] ";R3$;" ";
1040   ON ERR THEN GOTO 2620
1050   GOTO 1070
1060   PRINT "<7>";
1070   INPUT "> ",A4$;
1080   ON ERR THEN GOTO 1060
1090   IF LEN(A4$)=0 THEN LET A4$=A3$
1100   LET V6=VAL(A4$)
1110   ON ERR THEN STOP
1120   PRINT
1130   LET A3$=A4$
1140   GOTO 1260
1150   PRINT "MASS OF ADDED SPIKE: [";A5$;"] ";R3$[1,2];" ";
1160   ON ERR THEN GOTO 2620
1170   GOTO 1190
1180   PRINT "<7>";
1190   INPUT "> ",A6$;
1200   ON ERR THEN GOTO 1180
1210   IF LEN(A6$)=0 THEN LET A6$=A5$
1220   LET V6=VAL(A6$)
1230   ON ERR THEN STOP
1240   PRINT
1250   LET A5$=A6$
1260   LET D1[4]=V5
1270   LET D1[5]=V6

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         0         0         0         0         0         0         0
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PROGRAM LISTING FOR ISCN02.AS

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         0         0         0         0         0         0         0
1280   GOSUB 2540
1290   LET W2=D1[2]
1300   GOSUB 2510
1310   GOSUB 2660
1320   LET D2[4]=V7
1330   LET D2[5]=V8
1340   GOSUB 2570
1350 NEXT W1
1360 PRINT
1370 PRINT "MISTAKES ON SPIKES ? ([N] OR Y) ";
1380 ON ERR THEN GOTO 2620
1390 INPUT " > ",A$;
1400 ON ERR THEN STOP
1410 PRINT
1420 IF LEN(A$)=0 THEN GOTO 1480
1430 IF A$="N" THEN GOTO 1480
1440 IF A$<>"Y" THEN GOTO 1360
1450 GOTO 0840
1460 REM [  DEFINE PRELIMINARY DILUTIONS   ]
1470 REM ==================================
1480 PRINT
1490 PRINT "DO YOU WANT TO MODIFY DILUTION FACTORS ? ([N] OR Y) ";
1500 ON ERR THEN GOTO 2620
1510 INPUT " > ",A$;
1520 ON ERR THEN STOP
1530 PRINT
1540 IF LEN(A$)=0 THEN GOTO 3120
1550 IF A$="N" THEN GOTO 3120
1560 IF A$<>"Y" THEN GOTO 1480
1570 PRINT
1580 PRINT "DILUTION OPTIONS: ([H]=WJX) ";
1590 GOTO 1650
1600 PRINT "   = - EQUAL DILUTIONS FOR ALL APPLICABLE SAMPLES"
1610 PRINT "   W - DEFINE WHEEL POSITION OF SAMPLE TO BE DILUTED"
1620 PRINT "   J - JUMP THROUGH LIST OF DILUTABLE SAMPLES"
1630 PRINT "   X - EXIT SESSION / APPROVE DILUTIONS"
1640 GOTO 1570
1650 ON ERR THEN GOTO 2620
1660 INPUT " > ",M4$;
1670 ON ERR THEN STOP
1680 PRINT
1690 IF LEN(M4$)=0 THEN GOTO 1600

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         0         0         0         0         0         0         0
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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  5
                   PROGRAM LISTING FOR ISCN02.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
1700 IF LEN(M4$)>1 THEN GOTO 1740
1710 LET M4=POS("H=WJX",M4$,1)
1720 ON ERR THEN STOP
1730 IF M4>0 THEN GOTO 1760
1740 PRINT "<7>";
1750 GOTO 1570
1760 LET M4=M4-1
1770 IF M4=0 THEN GOTO 1600
1780 IF M4=4 THEN GOTO 3120
1790 IF M4<>3 THEN GOTO 2050
1800 REM [    COMPUTER ASSISTED              ]
1810 REM -----------------------------------
1820 PRINT
1830 FOR W1=1 TO W0
1840   GOSUB 2480
1850   IF D1[3]<>2 THEN GOTO 2030
1860   PRINT
1870   PRINT USING "WHEEL POS ### ",W1;
1880   PRINT "/";I1$;"/";
1890   PRINT "CURRENT DILUTION FACTOR = ";(D1[4]+D1[5])/D1[4]
1900   PRINT "DILUTE THIS SAMPLE ? ([N], Y, OR 0 TO EXIT) ";
1910   ON ERR THEN GOTO 2620
1920   INPUT " > ",A$;
1930   ON ERR THEN STOP
1940   PRINT
1950   IF A$="0" THEN GOTO 2040
1960   IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 1980
1970   GOTO 2030
1980   IF A$="Y" THEN GOTO 2010
1990   PRINT "<7>";
2000   GOTO 1860
2010   GOSUB 2660
2020   GOSUB 2950
2030 NEXT W1
2040 GOTO 1570
2050 IF M4<>2 THEN GOTO 2290
2060 REM [  CHOSEN BY WHEEL POSITION        ]
2070 REM -----------------------------------
2080 PRINT
2090 PRINT "WHEEL POSITION OF SAMPLE TO BE DILUTED (0 TO EXIT) ";
2100 ON ERR THEN GOTO 2620
2110 INPUT W1;

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         0          0          0          0          0          0          0
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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  6
                   PROGRAM LISTING FOR ISCN02.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
2120 ON ERR THEN STOP
2130 PRINT
2140 IF W1=0 THEN GOTO 1570
2150 IF W1>=1 THEN IF W1<=W0 THEN GOTO 2180
2160 PRINT "<7>";
2170 GOTO 2080
2180 GOSUB 2480
2190 IF D1[3]=2 THEN GOTO 2230
2200 PRINT "/";I1$;"/  IS NOT AN UNKNOWN SAMPLE!<7>"
2210 PRINT
2220 GOTO 2080
2230 PRINT USING "WHEEL POS ### ",W1;
2240 PRINT "/";I1$;"/";
2250 PRINT "CURRENT DILUTION FACTOR = ";(D1[4]+D1[5])/D1[4]
2260 GOSUB 2660
2270 GOSUB 2950
2280 GOTO 2080
2290 IF M4<>1 THEN GOTO 1740
2300 REM [  EQUIVALENT DILUTIONS            ]
2310 REM -----------------------------------
2320 PRINT
2330 PRINT "EQUAL DILUTION FACTORS FOR APPLICABLE SAMPLES."
2340 GOSUB 2660
2350 PRINT
2360 FOR W1=1 TO W0
2370   GOSUB 2480
2380   IF D1[3]<>2 THEN GOTO 2430
2390   IF V9=(D1[4]+D1[5])/D1[4] THEN GOTO 2430
2400   PRINT USING "WHEEL POS ### ",W1;
2410   PRINT "/";I1$;"/  FACTOR CHANGED FROM";(D1[4]+D1[5])/D1[4];"TO"
*  ;V9
2420   GOSUB 2950
2430 NEXT W1
2440 PRINT
2450 GOTO 1570
2460 REM [  READ/WRITE (.DF) SUBROUTINES   ]
2470 REM **********************************
2480 MAT READ FILE[1,W1],D1
2490 READ FILE[0,W1],I1$
2500 RETURN
2510 MAT READ FILE[1,W2],D2
2520 READ FILE[0,W2],I2$

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         0          0          0          0          0          0          0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  7
                     PROGRAM LISTING FOR ISCN02.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2530 RETURN
2540 MAT WRITE FILE[1,W1],D1
2550 WRITE FILE[0,W1],I1$
2560 RETURN
2570 MAT WRITE FILE[1,W2],D2
2580 WRITE FILE[0,W2],I2$
2590 RETURN
2600 REM [   ERROR/RETRY  SEGMENT          ]
2610 REM ++++++++++++++++++++++++++++++++++++
2620 PRINT "<7> ";
2630 RETRY
2640 REM [  VOLUME ENTRY SUBROUTINE        ]
2650 REM ************************************
2660 GOTO 2690
2670 PRINT "<7>ERROR"
2680 PRINT
2690 PRINT "ORIGINAL SAMPLE VOLUME: [";A7$;"] ML ";
2700 ON ERR THEN GOTO 2620
2710 INPUT " > ",V7$
2720 ON ERR THEN GOTO 2690
2730 IF LEN(V7$)=0 THEN LET V7$=A7$
2740 LET V7=VAL(V7$)
2750 ON ERR THEN STOP
2760 LET A7$=V7$
2770 LET V7=V7/1000
2780 PRINT "DILUTION VOLUME ADDED: [";A8$;"] ML ";
2790 ON ERR THEN GOTO 2620
2800 INPUT " > ",V8$
2810 ON ERR THEN GOTO 2780
2820 IF LEN(V8$)=0 THEN LET V8$=A8$
2830 LET V8=VAL(V8$)
2840 ON ERR THEN STOP
2850 LET A8$=V8$
2860 LET V8=V8/1000
2870 LET V9=1
2880 ON ERR THEN GOTO 2670
2890 LET V9=(V7+V8)/V7
2900 ON ERR THEN STOP
2910 PRINT "DILUTION FACTOR = ";V9
2920 RETURN
2930 REM [  CHANGE DILUTION FACTOR(S)      ]
2940 REM ************************************

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  8
                     PROGRAM LISTING FOR ISCN02.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2950 LET D1[4]=V7
2960 LET D1[5]=V8
2970 GOSUB 2540
2980 IF D1[2]<>-1 THEN GOTO 3110
2990 LET W2=W1
3000 LET W2=W2+1
3010 IF W2>W0 THEN GOTO 3110
3020 GOSUB 2510
3030 IF D2[2]<>W1 THEN GOTO 3000
3040 IF I2$[12,14]="LSF" THEN GOTO 3070
3050 LET D2[4]=V7
3060 LET D2[5]=V8
3070 PRINT USING "WHEEL POS ### ",W2;
3080 PRINT "/";I2$;"/  ALSO CHANGED."
3090 GOSUB 2570
3100 GOTO 3000
3110 RETURN
3120 IF Q2[5]=0 THEN GOTO 4000
3130 PRINT
3140 PRINT "EDIT CHECK STANDARD LIMITS ? ([N] OR Y) ";
3150 ON ERR THEN GOTO 5550
3160 INPUT "> ",A$;
3170 ON ERR THEN STOP
3180 PRINT
3190 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 3210
3200 GOTO 3920
3210 IF A$="Y" THEN GOTO 3240
3220 PRINT "<7>";
3230 GOTO 3130
3240 LET A1$=STR$(Q[1])
3250 PRINT
3260 GOTO 3280
3270 PRINT "<7>";
3280 PRINT "   UPPER CONTROL LIMIT    [";A1$;"]";
3290 ON ERR THEN GOTO 5550
3300 INPUT "> ",A2$;
3310 ON ERR THEN GOTO 3270
3320 PRINT
3330 IF LEN(A2$)=0 THEN LET A2$=A1$
3340 LET V=VAL(A2$)
3350 ON ERR THEN STOP
3360 LET Q[1]=V

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         0         0         0         0         0         0         0
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1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
3370 LET A1$=STR$(Q[2])
3380 GOTO 3400
3390 PRINT "<7>";
3400 PRINT "   UPPER WARNING LIMIT   [";A1$;"]";
3410 ON ERR THEN GOTO 5550
3420 INPUT "> ",A2$;
3430 ON ERR THEN GOTO 3390
3440 PRINT
3450 IF LEN(A2$)=0 THEN LET A2$=A1$
3460 LET V=VAL(A2$)
3470 ON ERR THEN STOP
3480 LET Q[2]=V
3490 LET A1$=STR$(Q[3])
3500 GOTO 3520
3510 PRINT "<7>";
3520 PRINT "   MEAN                  [";A1$;"]";
3530 ON ERR THEN GOTO 5550
3540 INPUT "> ",A2$;
3550 ON ERR THEN GOTO 3510
3560 PRINT
3570 IF LEN(A2$)=0 THEN LET A2$=A1$
3580 LET V=VAL(A2$)
3590 ON ERR THEN STOP
3600 LET Q[3]=V
3610 LET A1$=STR$(Q[4])
3620 GOTO 3640
3630 PRINT "<7>";
3640 PRINT "   LOWER WARNING LIMIT   [";A1$;"]";
3650 ON ERR THEN GOTO 5550
3660 INPUT "> ",A2$;
3670 ON ERR THEN GOTO 3630
3680 PRINT
3690 IF LEN(A2$)=0 THEN LET A2$=A1$
3700 LET V=VAL(A2$)
3710 ON ERR THEN STOP
3720 LET Q[4]=V
3730 LET A1$=STR$(Q[5])
3740 GOTO 3760
3750 PRINT "<7>";
3760 PRINT "   LOWER CONTROL LIMIT   [";A1$;"]";
3770 ON ERR THEN GOTO 5550
3780 INPUT "> ",A2$;

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         0          0          0          0          0          0          0
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1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
3790 ON ERR THEN GOTO 3750
3800 PRINT
3810 IF LEN(A2$)=0 THEN LET A2$=A1$
3820 LET V=VAL(A2$)
3830 ON ERR THEN STOP
3840 LET Q[5]=V
3850 FOR K=2 TO 5
3860   IF Q[K-1]<Q[K] THEN GOTO 3890
3870 NEXT K
3880 GOTO 3920
3890 PRINT
3900 PRINT "<7>LIMITS WERE IMPROPERLY ENTERED.<7>"
3910 GOTO 3240
3920 FOR W1=1 TO W0
3930   MAT READ FILE[1,W1],D1
3940   IF D1[3]<>4 THEN GOTO 3990
3950   FOR J=1 TO 5
3960     LET D1[13+J]=Q[J]
3970   NEXT J
3980   MAT WRITE FILE[1,W1],D1
3990 NEXT W1
4000 WRITE FILE[2,0],Q[1],Q[2],Q[3],Q[4],Q[5],M0,M1,M2,M5,R1
4010 LET S0$="FORCED ZERO    LINEAR         QUADRATIC      "
4020 LET S0$=S0$,"CUBIC          INTERPOLATION  "
4030 LET S1$="SEMI-AUTOMATIC FULLY-AUTOMATIC"
4040 LET S2$="MANUAL   AUTOMATIC"
4050 LET S5$="TERMINAL       LINEPRINTER    "
4060 LET S5$=S5$,"BOTH TERM & LPTNONE GENERATED"
4070 PRINT
4080 PRINT "LAST-USED INITIAL RUN-MODES: ([CR] FOR DEFAULT) "
4090 PRINT "   COMPUTATIONAL: (HZLQCI) [";S0$[M0*15+1,(M0+1)*15];"] ";
4100 ON ERR THEN GOTO 5550
4110 INPUT "> ",A$;
4120 ON ERR THEN STOP
4130 PRINT
4140 IF LEN(A$)>0 THEN GOTO 4170
4150 LET A=M0
4160 GOTO 4280
4170 IF LEN(A$)=1 THEN GOTO 4200
4180 PRINT "<7>";
4190 GOTO 4090
4200 IF A$<>"H" THEN GOTO 4270

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
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PROGRAM LISTING FOR ISCN02.AS

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1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4210 PRINT "     Z - FORCED ZERO LINEAR FIT"
4220 PRINT "     L - REGULAR LINEAR FIR"
4230 PRINT "     Q - QUADRATIC FIT"
4240 PRINT "     C - CUBIC FIT"
4250 PRINT "     I - INTERPOLATION"
4260 GOTO 4090
4270 LET A=POS("ZLQCI",A$,1)-1
4280 IF A<0 THEN GOTO 4180
4290 IF A=4 THEN GOTO 4320
4300 IF A<S0 THEN GOTO 4350
4310 GOTO 4330
4320 IF S0>=2 THEN GOTO 4350
4330 PRINT "<7>MODE ERROR<7>!"
4340 GOTO 4090
4350 LET M0=A
4360 IF S0<2*W0/3 THEN IF S9>2*W0/3 THEN GOTO 4380
4370 GOTO 4470
4380 PRINT "AFTER WHICH WHEEL POSITION SHOULD CALIBRATION OCCUR ? ";
4390 ON ERR THEN GOTO 5550
4400 INPUT "> ",S8;
4410 ON ERR THEN STOP
4420 PRINT
4430 IF S8>=1 THEN IF S8<=W0 THEN IF S8=INT(S8) THEN GOTO 4460
4440 PRINT "<7>";
4450 GOTO 4380
4460 LET S9=S8+1
4470 PRINT "   SEQUENCING:    (HFS)    [";S1$[M1*15+1,(M1+1)*15];"] ";
4480 ON ERR THEN GOTO 5550
4490 INPUT "> ",A$;
4500 ON ERR THEN STOP
4510 PRINT
4520 IF LEN(A$)>0 THEN GOTO 4560
4530 LET A$="S"
4540 IF M1=1 THEN LET A$="F"
4550 GOTO 4630
4560 IF LEN(A$)=1 THEN GOTO 4590
4570 PRINT "<7>";
4580 GOTO 4470
4590 IF A$<>"H" THEN GOTO 4630
4600 PRINT "     F - FULLY AUTOMATIC SEQUENCE"
4610 PRINT "     S - SEMI-AUTOMATIC SEQUENCE (YOU CONTROL MEASUREMENTS
*    )"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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PROGRAM LISTING FOR ISCN02.AS

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1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4620 GOTO 4470
4630 LET A=0
4640 IF A$="S" THEN GOTO 4680
4650 LET A=1
4660 IF A$="F" THEN GOTO 4680
4670 GOTO 4570
4680 LET M1=A
4690 IF M1=0 THEN GOTO 4810
4700 PRINT "       REPLICATES: [";R1;"] ";
4710 ON ERR THEN GOTO 5550
4720 INPUT "> ",A$;
4730 ON ERR THEN STOP
4740 PRINT
4750 IF LEN(A$)=0 THEN GOTO 4810
4760 LET A=POS("123456",A$,1)
4770 IF A>0 THEN GOTO 4800
4780 PRINT "<7>";
4790 GOTO 4700
4800 LET R1=A
4810 PRINT "  DATA ACCESS:   (HMA)    [";S2$[M2*9+1,(M2+1)*9];"] ";
4820 ON ERR THEN GOTO 5550
4830 INPUT "> ",A$;
4840 ON ERR THEN STOP
4850 PRINT
4860 IF LEN(A$)>0 THEN GOTO 4890
4870 LET A=M2
4880 GOTO 4990
4890 LET A=1
4900 IF A$="A" THEN GOTO 4990
4910 LET A=0
4920 IF A$="M" THEN GOTO 4990
4930 IF A$="H" THEN GOTO 4960
4940 PRINT "<7>";
4950 GOTO 4810
4960 PRINT "      M - MANUAL OR KEYBOARD ENTRY OF ABSORBANCE DATA"
4970 PRINT "      A - AUTOMATIC COMPUTER ACCESS OF ABSORBANCE DATA"
4980 GOTO 4810
4990 LET M2=A
5000 PRINT "  OUTPUT REPORT: (HTLBN)  [";S5$[M5*15+1,(M5+1)*15];"] ";
5010 ON ERR THEN GOTO 5550
5020 INPUT "> ",A$;
5030 ON ERR THEN STOP

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE 13
                  PROGRAM LISTING FOR ISCN02.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
5040 PRINT
5050 IF LEN(A$)>0 THEN GOTO 5080
5060 LET A=M5
5070 GOTO 5200
5080 IF LEN(A$)=1 THEN GOTO 5110
5090 PRINT "<7>";
5100 GOTO 5000
5110 IF A$<>"H" THEN GOTO 5170
5120 PRINT "      T - TERMINAL ONLY"
5130 PRINT "      L - LINEPRINTER ONLY"
5140 PRINT "      B - BOTH TERMINAL AND LINEPRINTER"
5150 PRINT "      N - NONE GENERATED"
5160 GOTO 5000
5170 LET A=POS("TLBN",A$,1)
5180 IF A=0 THEN GOTO 5090
5190 LET M5=A-1
5200 WRITE FILE[2,0],Q[1],Q[2],Q[3],Q[4],Q[5],M0,M1,M2,M5,R1
5210 WRITE FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
5220 WRITE FILE[2,4],"",1,0,0,-1E+50,1E+50,0,"",""
5230 WRITE FILE[2,15],M0,M1,R1,M2,M5,0,0,0,0,0
5240 PRINT
5250 PRINT "MISTAKES ON INITIAL RUN MODES ? ([N] OR Y) ";
5260 ON ERR THEN GOTO 5550
5270 INPUT " > ",A$;
5280 ON ERR THEN STOP
5290 PRINT
5300 IF LEN(A$)=0 THEN GOTO 5350
5310 IF A$="N" THEN GOTO 5350
5320 IF A$="Y" THEN GOTO 4010
5330 PRINT "<7>";
5340 GOTO 5240
5350 NOESC
5360 IF M2=0 THEN GOTO 5420
5370 ON ERR THEN GOTO 5390
5380 CHAIN P2$ THEN GOTO 0230
5390 ON ERR THEN STOP
5400 LET M2=0
5410 WRITE FILE[2,15],M0,M1,R1,M2,M5,0,0,0,0,0
5420 ON ERR THEN GOTO 5440
5430 CHAIN P4$
5440 ON ERR THEN GOTO 5460
5450 CHAIN P1$

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                  PROGRAM LISTING FOR ISCN02.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
5460 ON ERR THEN BYE
5470 CHAIN "INITIALIZE"
5480 PRINT "[";A1$;"]";
5490 ON ERR THEN GOTO 5550
5500 INPUT " > ",A$;
5510 ON ERR THEN STOP
5520 PRINT
5530 IF LEN(A$)<>0 THEN LET A1$=A$
5540 RETURN
5550 PRINT "<7> ";
5560 RETRY
5570 NOESC
5580 PRINT
5590 PRINT
5600 PRINT "RESTART PRE-RUN INPUTS OR QUIT ? ([R] OR Q) ";
5610 ON ERR THEN GOTO 5550
5620 INPUT "> ",A$;
5630 ON ERR THEN STOP
5640 PRINT
5650 IF A$="Q" THEN GOTO 5700
5660 IF A$="R" THEN GOTO 5720
5670 IF LEN(A$)=0 THEN GOTO 5720
5680 PRINT "<7>";
5690 GOTO 5590
5700 ON ERR THEN GOTO 5740
5710 CHAIN P3$
5720 ON ERR THEN GOTO 5740
5730 CHAIN P1$
5740 ON ERR THEN STOP
5750 ESC
5760 STOP

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

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```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                       SYMBOL TABLE FOR ISCN02.AS

SYMBOL    REFERENCES
------  --------------------------------------------------------------------

 0230   5380
 0390   0460
 0450   0430
 0470   0440
 0620   0590
 0710   0670
 0760   0700
 0840   1450
 0910   0950
 0930   0830
 0940   0920
 1060   1080
 1070   1050
 1150   1020
 1180   1200
 1190   1170
 1260   1140
 1350   0860
 1360   1440
 1480   0810   1420   1430   1560
 1570   1640   1750   2040   2140   2450
 1600   1690   1770
 1650   1590
 1740   1700   2290
 1760   1730
 1860   2000
 1980   1960
 2010   1980
 2030   1850   1970
 2040   1950
 2050   1790
 2080   2170   2220   2280
 2180   2150
 2230   2190
 2290   2050
 2430   2380   2390
 2480   0850   1840   2180   2370
 2510   1300   3020
 2540   1280   2970
 2570   1340   3090
 2620   0910   1040   1160   1380   1500   1650   1910   2100   2700   2790
 2660   1310   2010   2260   2340
 2670   2880
 2690   2660   2720
 2780   2810
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                       SYMBOL TABLE FOR ISCN02.AS

SYMBOL    REFERENCES
------  --------------------------------------------------------------------

 2950   2020   2270   2420
 3000   3030   3100
 3070   3040
 3110   2980   3010
 3120   1540   1550   1780
 3130   3230
 3210   3190
 3240   3210   3910
 3270   3310
 3280   3260
 3390   3430
 3400   3380
 3510   3550
 3520   3500
 3630   3670
 3640   3620
 3750   3790
 3760   3740
 3890   3860
 3920   3200   3880
 3990   3940
 4000   3120
 4010   5320
 4090   4190   4260   4340
 4170   4140
 4180   4280
 4200   4170
 4270   4200
 4280   4160
 4320   4290
 4330   4310
 4350   4300   4320
 4380   4360   4450
 4460   4430
 4470   4370   4580   4620
 4560   4520
 4570   4670
 4590   4560
 4630   4550   4590
 4680   4640   4660
 4700   4790
 4800   4770
 4810   4690   4750   4950   4980
 4890   4860
 4960   4930
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                    SYMBOL TABLE FOR ISCN02.AS

SYMBOL   REFERENCES
------   ----------------------------------------------------------------

 4990   4880  4900  4920
 5000   5100  5160
 5080   5050
 5090   5180
 5110   5080
 5170   5110
 5200   5070
 5240   5340
 5350   5300  5310
 5390   5370
 5420   5360
 5440   5420
 5460   5440
 5480   0330  0370  0410  0490
 5550   0620  3150  3290  3410  3530  3650  3770  4100  4390  4480
        4710  4820  5010  5260  5490  5610
 5570   0240
 5590   5690
 5700   5650
 5720   5660  5670
 5740   5700  5720
 A      4150  4270  4280  4290  4300  4350  4630  4650  4680  4760
        4770  4800  4870  4890  4910  4990  5060  5170  5180  5190
 A$     0090  0630  0660  0670  0680  1390  1420  1430  1440  1510
        1540  1550  1560  1920  1950  1960  1980  3160  3190  3210
        4110  4140  4170  4200  4270  4490  4520  4530  4540  4560
        4590  4640  4660  4720  4750  4760  4830  4860  4900  4920
        4930  5020  5050  5080  5110  5170  5270  5300  5310  5320
        5500  5530  5620  5650  5660  5670
 A1$    0090  0320  0340  0360  0380  0400  0420  0480  0500  0570
        0590  0600  0660  0760  0900  0960  1010  3240  3280  3330
        3370  3400  3450  3490  3520  3570  3610  3640  3690  3730
        3760  3810  5480  5530
 A2$    0130  0940  0960  0970  1010  3300  3330  3340  3420  3450
        3460  3540  3570  3580  3660  3690  3700  3780  3810  3820
 A3$    0770  1030  1090  1130
 A4$    1070  1090  1100  1130
 A5$    0780  1150  1210  1250
 A6$    1190  1210  1220  1250
 A7$    0790  2690  2730  2760
 A8$    0800  2780  2820  2850
 B0     0280  5210
 D0$    0130  0140  0200
 D1     2480  2540  3930  3980
 D1[    0080  0860  1260  1270  1290  1850  1890  2190  2250  2380
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                    SYMBOL TABLE FOR ISCN02.AS

SYMBOL   REFERENCES
------   ----------------------------------------------------------------

        2390  2410  2950  2960  2980  3940  3960
 D2     2510  2570
 D2[    0080  1320  1330  3030  3050  3060
 F7$    0110  0140  0200
 FL#0   2490  2520  2550  2580
 FL#1   2480  2510  2540  2570  3930  3980
 FL#2   0140  0200  0230  0270  0280  0290  0510  0570  0680  0720
        4000  5200  5210  5220  5230  5410
 I      0560  0570  0580  0680  0690  0710
 I1$    0110  0890  1880  2200  2240  2410  2490  2550
 I2$    0110  2520  2580  3040  3080
 J      0710  0720  0730  3950  3960  3970
 K      3850  3860  3870
 M0     0270  4000  4090  4150  4350  5200  5230  5410
 M1     0270  4000  4470  4540  4680  4690  5200  5230  5410
 M2     0270  4000  4810  4870  4990  5200  5230  5360  5400  5410
 M4     1710  1730  1760  1770  1780  1790  2050  2290
 M4$    1660  1690  1700  1710
 M5     0270  4000  5000  5060  5190  5200  5230  5410
 P$     0110  0140  0150  0160  0170  0180  0190  0200
 P0$    0140  0150  0200
 P1$    0140  0160  0200  5450  5730
 P2$    0140  0170  0200  5380
 P3$    0180  5710
 P4$    0190  5430
 Q0     0290
 Q1     0290
 Q1$    0110
 Q2[    0080  0290  0810  3120
 Q[     0080  0270  3240  3360  3370  3480  3490  3600  3610  3720
        3730  3840  3860  3960  4000  5200
 R0     0280  5210
 R0$    0140  0200
 R1     0270  4000  4700  4800  5200  5230  5410
 R1$    0090  0230  0320  0340  0510
 R2$    0090  0230  0360  0380  0510
 R3$    0090  0230  0400  0420  0430  0510  1030  1150
 R4$    0090  0230  0480  0500  0510
 S0     0280  4300  4320  4360  5210
 S0$    0130  4010  4020  4090
 S1$    0130  4030  4470
 S2$    0130  4040  4810
 S5$    0130  4050  4060  5000
 S8     4400  4430  4460
 S9     0280  4360  4460  5210
```

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```
     STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
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                       SYMBOL TABLE FOR ISCN02.AS

SYMBOL    REFERENCES
------  ---------------------------------------------------------------
 T0     0280  5210
 U0     0280  5210
 V      3340  3360  3460  3480  3580  3600  3700  3720  3820  3840
 V5     0970  0980  1020  1260
 V6     1100  1220  1270
 V7     1320  2740  2770  2890  2950  3050
 V7$    2710  2730  2740  2760
 V8     1330  2830  2860  2890  2960  3060
 V8$    2800  2820  2830  2850
 V9     2390  2410  2870  2890  2910
 W0     0280  0840  1830  2150  2360  3010  3920  4360  4430  5210
 W1     0840  0880  1350  1830  1870  2030  2110  2140  2150  2230
        2360  2400  2430  2480  2490  2540  2550  2990  3030  3920
        3930  3980  3990
 W2     1290  2510  2520  2570  2580  2990  3000  3010  3070
 Y0     0280  5210
 Y9     0280  5210
```

SECTION 6

ISCN.03 - THE INSTRUMENT CHECKOUT PROGRAM

The ISCN.03 program gives an analyst the ability to check the data acquisition/reduction hardware and to initialize and define various software parameters associated with the automated instrument. The program is accessed prior to the start of an automatic RUN sequence. It may also be accessed from the ASCL (program ISCN.00), in which case an exit or ESCape from the program will invoke a CHAIN to the ISCN.00 program.

There are two essential techniques used to acquire data. One is to tap off ASCII characters from an intelligent instrument via an ASCII Character Buffer (ACB) box. Such data always constitute a fully-reduced peak height or peak area. Another technique is to acquire raw transmittance signals via an analog-to-digital (A/D) converter. Program software converts the digital transmittance curve to an absorbance curve, from which the peak height is ascertained. Instruments associated with the first technique are called "ASCII-interfaced" instruments, while those associated with the second technique are termed "analog-interfaced" instruments.

Described below are the various adaptations of the ISCN.03 program according to the type of instrument. A summary of the data acquisition and reduction procedure for each adaptation is also given. List file versions of the ISCN.03 (and ISCN.04) programs are maintained under the following name format:

lrrrmiiinn.AS where,

l - laboratory: A for Annapolis, C for Chicago, E for EMSL and M for MERL, etc.;

rrr - room number;

m - method of application: F for Flame and G for Graphite furnace;

iii - instrument type: 000 for PE-5000, 775 for Varian AA-775, 403 (or 503) for PE-403 (or PE-503), and AA5 (or AA6) for Varian AA-5 (or Varian AA-6);

nn - program extension: 03 or 04.

6.1 PERKIN-ELMER 5000 FLAME/FURNACE ASCII-INTERFACED ADAPTATION

After this program is CHAINed to from ISCN.00 or ISCN.02, it gets essential data from the transfer file (ISCN.TR) and zeroes the injection counter. It then permits the user to make any number of test injections. A reading may be triggered by making a test injection or by simply pressing the READ button on the instrument.

Data Acquisition and Reduction

A CALL 40[2] is used to access characters from the ACB box via the NOVA minicomputer. Each call retrieves the decimal equivalent of an ASCII character. Numbers are read and the ASCII string is recreated until a line feed (decimal equivalent ten) is encountered.

The module then scrutinizes the string (of usually ten to seventeen characters) in order to extract the absorbance. It first examines the last two characters. Should they be any of the following pairs,

AV - average
SD - standard deviation
AZ - auto zero

then the entire string is ignored and acquisition of a new string begins. If the final pair is any of the following,

S1 - standard #1
S2 - standard #2
S3 - standard #3
RS - reslope
CV - coefficient of variation
ER - error
C0 - concentration

then the string is ignored and an "ERRONEOUS DATA RECEIVED" message is sent to the user's terminal. When none of the above conditions concerning the final pair are encountered, then the module searches for the decimal point, isolates the portion of the string from two characters before the point to three characters after it, and converts that portion into a number by using the BASIC VAL function.

6.2 VARIAN AA-775 FURNACE ASCII-INTERFACED ADAPTION

After this program is CHAINed to from ISCN.00 or ISCN.02, it gets essential data from the transfer file (ISCN.TR) and zeroes the injection counter. It then permits the user to make any number of test injections.

Data Acquisition and Reduction

A CALL 40[2] is used to access characters from the ACB box via the NOVA minicomputer. Each call retrieves the decimal equivalent of an ASCII character. Numbers are read and the ASCII string is recreated until a line feed (decimal equivalent ten) is encountered.

The Varian AA-775 (used at EMSL-Cincinnati) outputs "65" as the leading characters of every string. The module finds the "65" and scrutinizes the remaining portion of the string. Within this portion, the first four characters, the eighth character, and the eighteenth character may be special qualifiers.

The module examines the first four qualifier characters. Should there by any of the following substrings,

ZERO - auto zero
MEAN - mean of measurements
SDEV - standard deviation of measurements
NUMb̸ - number of measurements used in statisitics

then the entire string is ignored and acquisition of a new string begins. If an "H" (peak height) or "A" (peak area) qualifier is *not* found in the *eighth* position, then the string is ignored and an "ERRONEOUS DATA RECEIVED" message is sent to the user's terminal. This error condition also occurs if a "C" (concentration) or "W" (weight input/correction) qualifier *is* found in the *eighteenth* position. When none of the above conditions concerning qualifiers are encountered, then the module searches for the decimal point, isolates the portion of the string from two characters before the point to three characters after it, and converts that portion into a number by using the BASIC *VAL* function.

6.3 PERKIN-ELMER 403/503 FURNACE ANALOG-INTERFACED ADAPTATION

The Perkin-Elmer 403 and 503 atomic absorption spectrophotometers can be equipped with an automatic sample changer (AS-1). The sampler may be controlled from the NOVA in order to permit data reduction of one sample before atomization of another. The instrument produces a strip chart recorder "sense pulse" at a fixed time interval (approximately 16.8 seconds) before atomization. Two analog channels, one for the baseline signal and the other for the sample signal, are connected from the instrument to the NOVA minicomputer's analog to digital converter. The digitized signals are retrieved from the NOVA whenever a BASIC program issues a real-time data acquisition CALL 7[3]. This call stores the signal data in a singly dimensioned array defined by the BASIC program.

If the Perkin-Elmer 403/503 furnace adaptation of the ISCN.03 program is CHAINed to from ISCN.00, then it acts only as a test facility (with flag E0 set to *one*). No timing parameters or test injection data are stored. If it is CHAINed to from ISCN.02, it acts as a test *and* parameter definition facility (with flag E0 set to *zero*). Consequently, all timing parameters are stored in file ISCN.TR, and *all* test injection data are stored in file ISCN.PK (after deletion of test injection data from the previous RUN).

The program then initializes data acquisition/reduction parameters for the system and permits the user to make any number of checks on beam levels. For each check, a twenty point CALL 7 is made. The odd location digital values are averaged as the reference beam, and the even locations as the sample beam. These two averages and their difference are displayed on the user terminal.

The program retrieves from the user the atomization time (T1) in seconds. It computes the delay time (Z6) and sampling interval (Z7) in terms of the sampling frequency (F clock ticks per second) as constrained by the number of points (N2), the atomization time (T1), the peak-points proportion (U1), and the fixed sense-to-atomization delay time (T0).

Once timing parameters are defined, the program permits the user to make any number of test injections. After each injection and data acquisition/reduction process, the program stores the plot data and can produce a crude plot of the peak (if the user desires). Timing parameters may also be adjusted any number of times.

Data Acquisition and Reduction

If the injection counter (Z9) is zero, then two CALLs 257[3] are issued to clear digital flags in the NOVA minicomputer's digital bay. Prior to every data collection call, a CALL 257 is issued to inform the NOVA that sample atomization may begin. (These CALLs 257 are important only when using an automatic sampler.)

The CALL 7 is then issued to collect point-pairs in the V array. These data are reduced according to the following algorithm:

1. convert signals to absorbances in array V;
2. locate array positions, I0 and I9(I2), of lowest and highest absorbances, respectively;
3. determine baseline average (A1) and standard deviation (A3);
4. search for three successively greater absorbances, all of which exceed (A1+[5xA3]), and if no such points are found define peak absorbance (V2) as weighted average of highest absorbance (V[I2]/2+(V[I2+1]+V[I2-1])/4) or as baseline average if weighted average can't be computed;
5. search for three successively decreasing absorbances;
6. assume peak is in range beginning/ending with demarcation points found in steps 4 and 5 (N3 and N4), and find peak point;
7. by application of least squares fitting technique, develop equation on five central points, and determine peak absorbance (V2);
8. subtract baseline average (A1) from peak absorbance (V2) to obtain "true" peak absorbance (V1).

6.4 VARIAN AA-5/AA-6 FLAME ANALOG-INTERFACED ADAPTATION

The Varian AA-5 and AA-6 atomic absorption spectrophotometers can be equipped with an automatic sample changer designed by Lawrence Livermore Laboratories. The movement of the sampler arm may be controlled from the

NOVA minicomputer by means of BASIC language calls to real-time subroutines (CALLS 21 and 22[3]). One analog channel is connected from the instrument to the NOVA's analog-to-digital converter. The digitized signals are retrieved from the NOVA whenever a BASIC program issues a CALL 7[3]. This call stores the signal data in a singly dimensioned array defined by the BASIC program.

If the Varian AA-5/AA-6 flame adaptation of the ISCN.03 program is CHAINed to from ISCN.00, then it acts only as a test facility (with flag E0 set to one). No timing parameters or test measurement data are stored. If it is CHAINed to from ISCN.02, it acts as a test and parameter definition facility (with flag E0 set to zero). Consequently, all timing parameters are stored in file ISCN.TR, and all test measurement data are stored in file ISCN.PK (after deletion of test measurement data from the previous RUN).

The program then initializes data acquisition/reduction parameters for the system. It references the first wheel position by requesting the user to set the sampler arm at wheel position one and to press the carriage return on the terminal. A CALL 22 for wheel position zero establishes the present position as the first, and a CALL 21, function one, immediately raises the arm (if already lowered).

The program proceeds to make any number of baseline measurements. The user is required to define the wheel position and to control the start of aspiration and data acquisition by pressing the carriage return twice. The arm is raised when measurement is completed or when the user ESCapes. One-hundred signals are acquired and converted to absorbances. The average signal and absorbance is computed and displayed on the user terminal. Once the baseline (B9) has been established, it remains throughout the run until superseded by an instrument blank measurement.

The program retrieves from the user the aspiration-to-atomization lag time in seconds (Z2, greater than zero) and the sampling time in seconds (T1, between 0.5 and 20 seconds). It computes the delay time (Z6) and sampling interval (Z7) in terms of the sampling frequency (F clock ticks per second) as constrained by the number of points (N2).

Once timing parameters are defined, the program permits the user to make any number of test measurements at user-defined wheel positions. (Since there are only forty positions in the wheel, a cyclical pattern is assumed such that a user-defined wheel position W is converted to position [1+ ([W-1] modulus 40)].) After each measurement and data acquisition/reduction process, the program stores the data but does not provide crude plots as in the Perkin-Elmer 403/503 furnace adaptation.

Data Acquisiton and Reduction

A CALL 22 for the correct wheel position is issued, followed immediately by a CALL 7. The collected signals are converted to absorbances. The mean absorbance (A1, V2) and standard deviation (A3) are computed. The true absorbance (V1) is defined as the mean absorbance less the baseline absorbance (V2-B9). The number of outliers, those absorbances beyond three standard deviations from the mean, is also computed. All of these computed values are displayed on the user's terminal.

Should the user ESCape-interrupt a CALL 22, the real-time reference to wheel position one may become disoriented if the sampler arm is still in horizontal motion. Thus, whenever a user issues an ESCape during the CALL 22, the data acquisition/reduction module requests the user to reset the arm to wheel position one and press the carriage return key. A CALL 22, wheel position zero, again establishes the reference for position one.

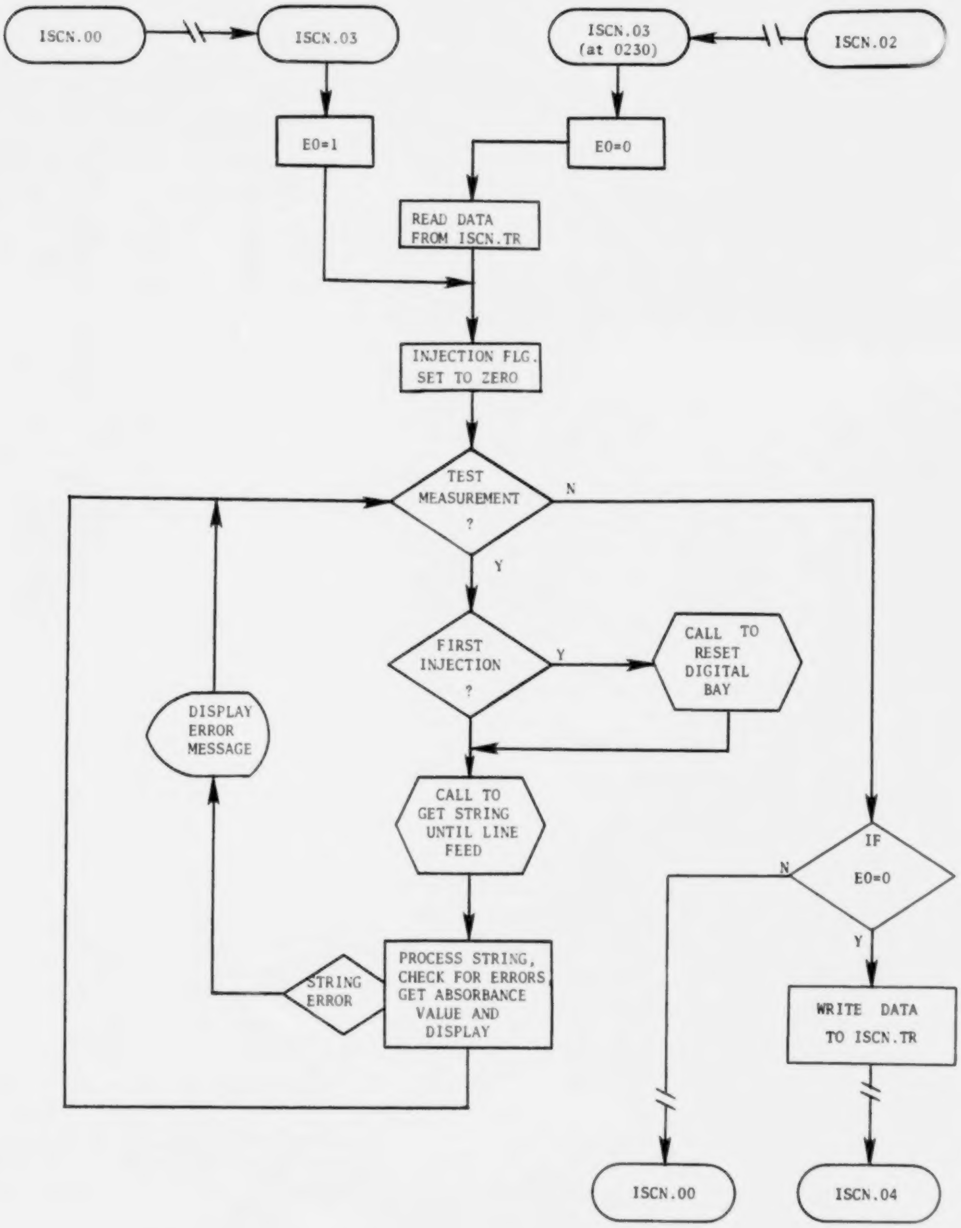
ISCN.00
ISCN.03
ISCN.03
(at 0230)
ISCN.02
E0=1
E0=0
READ DATA
FROM ISCN.TR
INJECTION FLG.
SET TO ZERO
TEST
MEASUREMENT
?
N
Y
FIRST
INJECTION
?
Y
CALL TO
RESET
DIGITAL
BAY
DISPLAY
ERROR
MESSAGE
CALL TO
GET STRING
UNTIL LINE
FEED
IF
E0=0
N
Y
STRING
ERROR
PROCESS STRING,
CHECK FOR ERRORS,
GET ABSORBANCE
VALUE AND
DISPLAY
WRITE DATA
TO ISCN.TR
ISCN.00
ISCN.04

Figure 6. Program ISCN.03 -- Instrument checkout module for Perkin-Elmer 5000 flame/furnace and Varian AA-775 furnace adaptations.

TABLE 5. SYMBOL DEFINITIONS FOR ISCN.03 FOR PERKIN-ELMER 5000 FLAME/FURNACE AND VARIAN AA-775 ADAPTATIONS

A	the results returned from the CALL 40
A$	the response to a prompt
B$	the composite string acquired from the ACB
B0$*	the two terminating characters in B$
C	the digital bay location (decimal)
D	a dummy accumulator variable
D0$	the date code for the Run File
E0	the entry/exit flag
F7$	the Run File name
L	the decimal-to-ASCII character locator
P$	the prefix for all programs and files
P0$	the previous program name (.02)
P1$	the current program name (.03)
P2$	the name of the program to be CHAINed (.04)
P3$	the ASCL router program name (.00)
P8	the position of the decimal point in the string
P6**	a string position variable
R0$	the PARMETH code of the Run File
R1$	the analyst's initials
R2$	the analyte name
R3$	the concentration units
R4$	the instrument name
S$	the ASCII character super string
V1	the numerical value of the output string
Z9	the injection/measurement counter

* Variable in PE-5000 flame/furnace adaptation only.
** Variable in Varian AA-775 furnace adaptation only.

```
   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
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                    PROGRAM LISTING FOR M465G00003.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.03 - INSTRUMENT SETUP AND CHECKOUT          *
0040 REM *            FOR PE5000,MERL,RM465,FLAMELESS,T.REED,GSC1      *
0050 REM *   BY: D.RYAN (UCCC), JULY 16, 1979                         *
0060 REM *   MOST RECENT REVISION: DECEMBER 27, 2979                  *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 LET E0=1
0090 ON ESC THEN GOTO 1010
0100 LET P$="ISCN"
0140 ON ERR THEN STOP
0150 LET P3$=P$,".00"
0160 DIM R1$[4],R2$[2],R3$[8],R4$[16],P$[10],P1$[10],P2$[10]
0170 DIM Z1$[1],Z2$[1],Z3$[1],Z4$[10],R$[10],A$[1]
0180 DIM F3$[10],F4$[10],D0$[20],I$[132],B$[132],S$[95]
0200 IF E0=1 THEN GOTO 0330
0210 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0212 READ FILE[2,9],R1$,R2$,R3$,R4$
0214 READ FILE[2,15],M0,M1,R1,M2,M5
0216 LET P0$=P$,".02"
0218 LET P1$=P$,".03"
0220 LET P2$=P$,".04"
0222 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0224 LET I2=0
0226 GOTO 0330
0228 REM ENTRY FROM GSCN.02
0230 LET E0=0
0232 GOTO 0090
0330 ESC
0340 PRINT
0350 PRINT "BEGIN INSTRUMENT CHECK OUT SESSION."
0360 LET Z7=0
0370 LET Z8=0
0380 LET Z9=0
0390 LET N0=0
0400 LET N1=0
0410 LET N2=0
0420 LET I2=0
0430 PRINT
0440 GOTO 0460
0450 PRINT "<7>";
0460 PRINT "DO YOU WISH TO MAKE A TEST INJECTION ? ([N] OR Y) ";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/3/1981                                                            PAGE  2
                    PROGRAM LISTING FOR M465G00003.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0470 ON ERR THEN GOTO 1170
0480 INPUT " > ",A$;
0490 ON ERR THEN STOP
0500 PRINT
0510 IF A$="Y" THEN GOTO 0550
0520 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 0450
0530 GOTO 1000
0540 REM ############## PE 5000 ROUTINE ######################
0550 IF Z9>0 THEN GOTO 0590
0560 LET C=25911
0570 LET D=0
0580 CALL 257,C,D
0590 LET S$=" !<34>#$%&'()*+,-./0123456789:;<=>?@"
0600 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_@"
0610 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^"
0620 LET A=0
0630 LET V1=-9999
0640 LET B$=""
0650 PRINT
0660 CALL 40,A
0670 PRINT USING "#### ",A;
0680 IF A=10 THEN GOTO 0750
0690 IF A>=32 THEN IF A<=126 THEN GOTO 0720
0710 GOTO 0660
0720 LET L=A-31
0730 LET B$=B$,S$[L,L]
0740 GOTO 0660
0750 PRINT
0760 PRINT B$
0770 LET B0$=B$[LEN(B$)-1,LEN(B$)]
0780 IF POS("AVSDAZ",B0$,1)>0 THEN GOTO 0640
0790 IF POS("S1S2S3RSCVERC ",B0$,1)>0 THEN GOTO 0860
0792 ON ERR THEN GOTO 0860
0800 LET P8=POS(B$,".",1)
0810 IF P8=0 THEN GOTO 0860
0820 LET V1=VAL(B$[P8-2,P8+3])
0830 LET Z9=Z9+1
0840 ON ERR THEN STOP
0850 GOTO 0900
0860 ON ERR THEN STOP
0870 PRINT
0880 PRINT "<7>ERRONEOUS<7> DATA<7> RECIEVED!<7>"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
 STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/3/1981                                                         PAGE  3
                    PROGRAM LISTING FOR M465G00003.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0890 REM ++++++++++++++++++++++++++++++++++++++++++++++++++++
0900 PRINT
0910 GOTO 0930
0920 PRINT "<7>";
0930 PRINT "DO YOU WANT TO MAKE ANOTHER TEST INJECTION ? ([N] OR Y) ";
0940 ON ERR THEN GOTO 1170
0950 INPUT " > ",A$;
0960 ON ERR THEN STOP
0970 PRINT
0980 IF A$="Y" THEN GOTO 0550
0982 IF LEN(A$)=0 THEN GOTO 1000
0990 IF A$<>"N" THEN GOTO 0920
1000 IF E0<>1 THEN GOTO 1100
1010 CLOSE
1020 PRINT
1030 PRINT "NOW EXITING TO ASCL(1)"
1040 NOESC
1050 ON ERR THEN GOTO 1070
1060 CHAIN P3$
1070 ON ERR THEN BYE
1080 CHAIN "INITIALIZE"
1090 STOP
1100 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,I2
1110 ON ERR THEN GOTO 1130
1120 CHAIN P2$
1130 ON ERR THEN STOP
1140 GOTO 1010
1150 REM [   ERROR/RETRY  SEGMENT          ]
1160 REM ++++++++++++++++++++++++++++++++++++




















1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
 STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/3/1981                                                         PAGE  4
                    SYMBOL TABLE FOR M465G00003.AS

SYMBOL    REFERENCES
------  ---------------------------------------------------------------
 0090   0232
 0330   0200  0226
 0450   0520
 0460   0440
 0550   0510  0980
 0590   0550
 0640   0780
 0660   0710  0740
 0720   0690
 0750   0680
 0860   0790  0792  0810
 0900   0850
 0920   0990
 0930   0910
 1000   0530  0982
 1010   0090  1140
 1070   1050
 1100   1000
 1130   1110
 1170   0470  0940
 A      0620  0660  0670  0680  0690  0720
 A$     0170  0480  0510  0520  0950  0980  0982  0990
 B$     0180  0640  0730  0760  0770  0800  0820
 B0$    0770  0780  0790
 C      0560  0580
 D      0570  0580
 D0$    0180  0210  0222
 E0     0080  0200  0230  1000
 F3$    0180
 F4$    0180
 F7$    0210  0222
 FL#2   0210  0212  0214  0222  1100
 I$     0180
 I2     0224  0420  1100
 L      0720  0730
 M0     0214
 M1     0214
 M2     0214
 M5     0214
 N0     0390  1100
 N1     0400  1100
 N2     0410  1100
 P$     0100  0150  0160  0210  0216  0218  0220  0222
 P0$    0210  0216  0222
 P1$    0160  0210  0218  0222
```

```
  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/3/1981                                                      PAGE  5
                     SYMBOL TABLE FOR M465G00003.AS

SYMBOL   REFERENCES
______   _________________________________________________________
 P2$     0160  0210  0220  0222  1120
 P3$     0150  1060
 P8      0800  0810  0820
 R$      0170
 R0$     0210  0222
 R1      0214
 R1$     0160  0212
 R2$     0160  0212
 R3$     0160  0212
 R4$     0160  0212
 S$      0180  0590  0600  0610  0730
 V1      0630  0820
 Z1$     0170
 Z2$     0170
 Z3$     0170
 Z4$     0170
 Z7      0360  1100
 Z8      0370  1100
 Z9      0380  0550  0830  1100
```

TYPING GUIDE SHEET
BEGIN FIRST LINE OF TEXT HERE
DROPPED HEAD BEGIN SECTIONS HERE
CENTER OF PAGE
TOP OF IMAGE AREA
6-1/2"
9-1/8"
BEGIN LAST LINE OF TEXT
3/8"
BOTTOM OF IMAGE AREA OUTSIDE DIMENSION FOR TABLES AND ILLUSTRATIONS
PAGE NUMBER
EPA-287 (Cin.)
(4-76)

TYPING GUIDE SHEET
BEGIN FIRST LINE OF TEXT HERE
DROPPED HEAD BEGIN SECTIONS HERE
CENTER OF PAGE
TOP OF IMAGE AREA
BEGIN LAST LINE OF TEXT
3/8"
BOTTOM OF IMAGE AREA, OUTSIDE DIMENSION FOR TABLES AND ILLUSTRATIONS
PAGE NUMBER
EPA-287 (Cin.)
(4-76)

```
      STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                         PAGE  1
                     PROGRAM LISTING FOR E520G77503.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.03 - INSTRUMENT SETUP AND CHECKOUT        *
0040 REM *            FOR AA775,EMSL,RM520,FLAMELESS,R.LEOBKER,GSCO  *
0050 REM *   BY: D.RYAN (UCCC), JULY 16, 1979                        *
0060 REM *   MOST RECENT REVISION: DECEMBER 27, 2979                 *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 LET E0=1
0090 ON ESC THEN GOTO 1010
0100 LET P$="ISCN"
0140 ON ERR THEN STOP
0150 LET P3$=P$,".00"
0160 DIM R1$[4],R2$[2],R3$[8],R4$[16],P$[10],P1$[10],P2$[10]
0170 DIM Z1$[1],Z2$[1],Z3$[1],Z4$[10],R$[10],A$[1]
0180 DIM F3$[10],F4$[10],D0$[20],I$[132],B$[132],S$[95]
0200 IF E0=1 THEN GOTO 0330
0210 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0212 READ FILE[2,9],R1$,R2$,R3$,R4$
0214 READ FILE[2,15],M0,M1,R1,M2,M5
0216 LET P0$=P$,".02"
0218 LET P1$=P$,".03"
0220 LET P2$=P$,".04"
0222 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0224 LET I2=0
0226 GOTO 0330
0228 REM ENTRY FROM GSCN.02
0230 LET E0=0
0232 GOTO 0090
0330 ESC
0340 PRINT
0350 PRINT "BEGIN INSTRUMENT CHECK OUT SESSION."
0360 LET Z7=0
0370 LET Z8=0
0380 LET Z9=0
0390 LET N0=0
0400 LET N1=0
0410 LET N2=0
0420 LET I2=0
0430 PRINT
0440 GOTO 0460
0450 PRINT "<7>";
0460 PRINT "DO YOU WISH TO MAKE A TEST INJECTION ? ([N] OR Y) ";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
      STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                         PAGE  2
                     PROGRAM LISTING FOR E520G77503.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0470 ON ERR THEN GOTO 1170
0480 INPUT " > ",A$;
0490 ON ERR THEN STOP
0500 PRINT
0510 IF A$="Y" THEN GOTO 0550
0520 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 0450
0530 GOTO 1000
0540 REM ############# PE 5000 ROUTINE #####################
0550 IF Z9>0 THEN GOTO 0590
0560 LET C=25911
0570 LET D=0
0580 CALL 257,C,D
0590 LET S$=" !<34>#$%&'()*+,-./0123456789:;<=>?@"
0600 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_@"
0610 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^"
0620 LET A=0
0630 LET V1=-9999
0640 LET B$=""
0650 PRINT
0660 CALL 40,A
0670 PRINT USING "#### ",A;
0680 IF A=10 THEN GOTO 0750
0690 IF A>=32 THEN IF A<=126 THEN GOTO 0720
0710 GOTO 0660
0720 LET L=A-31
0730 LET B$=B$,S$[L,L]
0740 GOTO 0660
0750 PRINT
0752 LET P6=POS(B$,"65",1)
0754 LET B$=B$[P6+2]
0760 PRINT B$
0770 IF POS("ZEROMEANSDEVNUM ",B$[1,4],1)>0 THEN GOTO 0640
0780 IF POS("CW",B$[LEN(B$)],1)>0 THEN GOTO 0860
0790 IF POS("HA",B$[8,8],1)=0 THEN GOTO 0860
0792 ON ERR THEN GOTO 0860
0800 LET P8=POS(B$,".",1)
0810 IF P8=0 THEN GOTO 0860
0820 LET V1=VAL(B$[P8-2,P8+3])
0830 LET Z9=Z9+1
0840 ON ERR THEN STOP
0850 GOTO 0900
0860 ON ERR THEN STOP

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                     PAGE  3
              PROGRAM LISTING FOR E520G77503.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0870 PRINT
0880 PRINT "<7>ERRONEOUS<7> DATA<7> RECIEVED!<7>"
0890 REM ##################################################
0900 PRINT
0910 GOTO 0930
0920 PRINT "<7>";
0930 PRINT "DO YOU WANT TO MAKE ANOTHER TEST INJECTION ? ([N] OR Y) ";
0940 ON ERR THEN GOTO 1170
0950 INPUT " > ",A$;
0960 ON ERR THEN STOP
0970 PRINT
0980 IF A$="Y" THEN GOTO 0550
0982 IF LEN(A$)=0 THEN GOTO 1000
0990 IF A$<>"N" THEN GOTO 0920
1000 IF E0<>1 THEN GOTO 1100
1010 CLOSE
1020 PRINT
1030 PRINT "NOW EXITING TO ASCL(1)"
1040 NOESC
1050 ON ERR THEN GOTO 1070
1060 CHAIN P3$
1070 ON ERR THEN BYE
1080 CHAIN "INITIALIZE"
1090 STOP
1100 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,I2
1110 ON ERR THEN GOTO 1130
1120 CHAIN P2$
1130 ON ERR THEN STOP
1140 GOTO 1010
1150 REM [   ERROR/RETRY  SEGMENT          ]
1160 REM ++++++++++++++++++++++++++++++++++++
1170 PRINT "<7> ";
1180 RETRY















1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                     PAGE  4
              SYMBOL TABLE FOR E520G77503.AS

SYMBOL   REFERENCES
------   ---------------------------------------------------------------
 0090    0232
 0330    0200  0226
 0450    0520
 0460    0440
 0550    0510  0980
 0590    0550
 0640    0770
 0660    0710  0740
 0720    0690
 0750    0680
 0860    0780  0790  0792  0810
 0900    0850
 0920    0990
 0930    0910
 1000    0530  0982
 1010    0090  1140
 1070    1050
 1100    1000
 1130    1110
 1170    0470  0940
 A       0620  0660  0670  0680  0690  0720
 A$      0170  0480  0510  0520  0950  0980  0982  0990
 B$      0180  0640  0730  0752  0754  0760  0770  0780  0790  0800
         0820
 C       0560  0580
 D       0570  0580
 D0$     0180  0210  0222
 E0      0080  0200  0230  1000
 F3$     0180
 F4$     0180
 F7$     0210  0222
 FL#2    0210  0212  0214  0222  1100
 I$      0180
 I2      0224  0420  1100
 L       0720  0730
 M0      0214
 M1      0214
 M2      0214
 M5      0214
 N0      0390  1100
 N1      0400  1100
 N2      0410  1100
 P$      0100  0150  0160  0210  0216  0218  0220  0222
 P0$     0210  0216  0222
 P1$     0160  0210  0218  0222
```

TYPING GUIDE SHEET

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                     PAGE  5
                   SYMBOL TABLE FOR E520G77503.AS

SYMBOL    REFERENCES
------    ------------------------------------------------------------
P2$     0160  0210  0220  0222  1120
P3$     0150  1060
P6      0752  0754
P8      0800  0810  0820
R$      0170
R0$     0210  0222
R1      0214
R1$     0160  0212
R2$     0160  0212
R3$     0160  0212
R4$     0160  0212
S$      0180  0590  0600  0610  0730
V1      0630  0820
Z1$     0170
Z2$     0170
Z3$     0170
Z4$     0170
Z7      0360  1100
Z8      0370  1100
Z9      0380  0550  0830  1100
```

EPA-287 (Cin.)
(4-76)

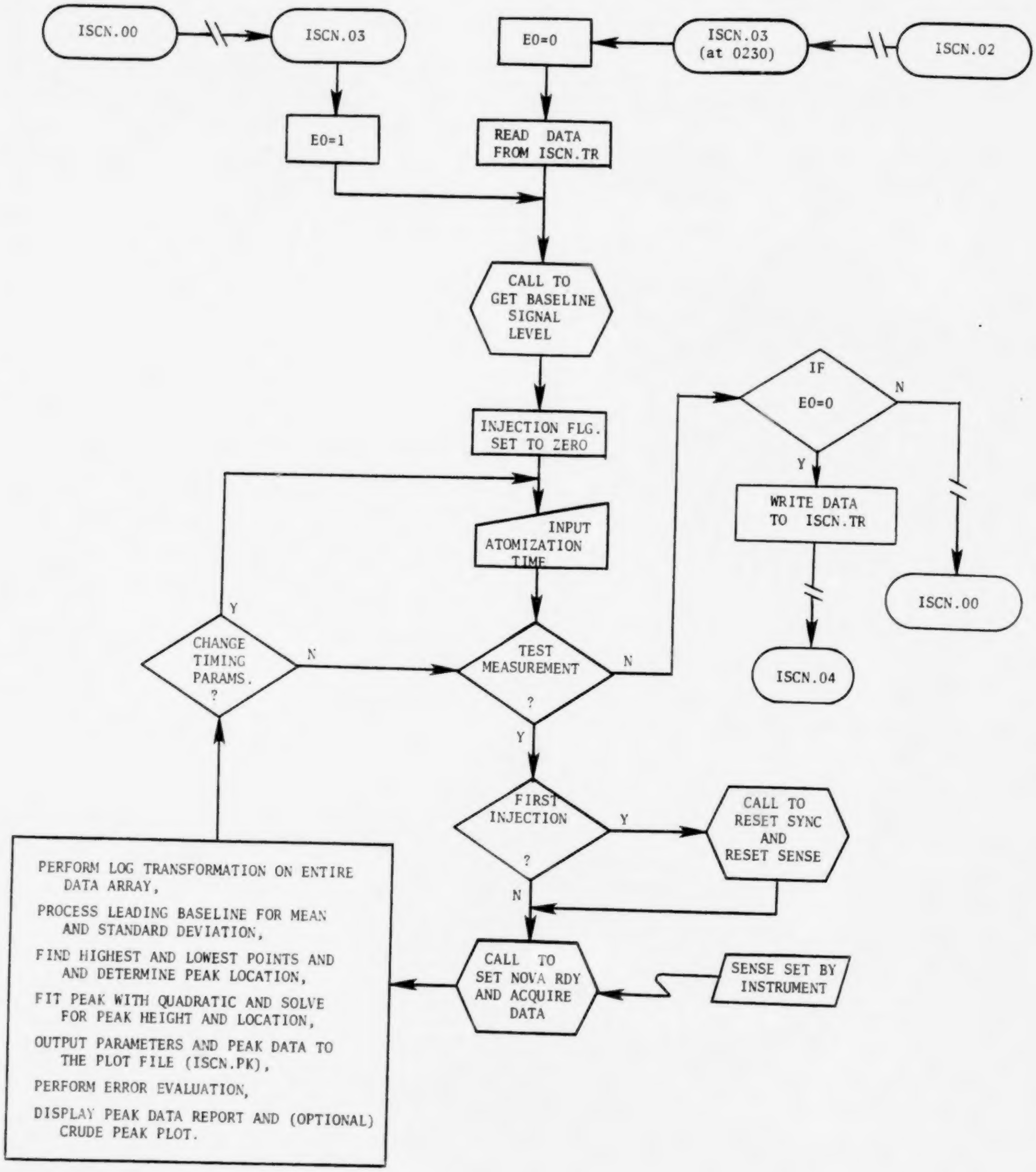
ISCN.00
ISCN.03
E0=0
ISCN.03
(at 0230)
ISCN.02
E0=1
READ DATA
FROM ISCN.TR
CALL TO
GET BASELINE
SIGNAL
LEVEL
IF
E0=0
N
Y
INJECTION FLG.
SET TO ZERO
WRITE DATA
TO ISCN.TR
INPUT
ATOMIZATION
TIME
ISCN.00
Y
CHANGE
TIMING
PARAMS.
?
N
TEST
MEASUREMENT
?
N
ISCN.04
Y
FIRST
INJECTION
?
Y
CALL TO
RESET SYNC
AND
RESET SENSE
N
PERFORM LOG TRANSFORMATION ON ENTIRE
DATA ARRAY,
PROCESS LEADING BASELINE FOR MEAN
AND STANDARD DEVIATION,
FIND HIGHEST AND LOWEST POINTS AND
AND DETERMINE PEAK LOCATION,
FIT PEAK WITH QUADRATIC AND SOLVE
FOR PEAK HEIGHT AND LOCATION,
OUTPUT PARAMETERS AND PEAK DATA TO
THE PLOT FILE (ISCN.PK),
PERFORM ERROR EVALUATION,
DISPLAY PEAK DATA REPORT AND (OPTIONAL)
CRUDE PEAK PLOT.
CALL TO
SET NOVA RDY
AND ACQUIRE
DATA
SENSE SET BY
INSTRUMENT

Figure 7. Program ISCN.03 -- Instrument checkout module for Perkin-Elmer 403/503 furnace adaptation.

TABLE 6. SYMBOL DEFINITIONS FOR ISCN.03 FOR PERKIN-ELMER 403/503 FURNACE ADAPTATION

A1	the mean baseline absorbance
A2	the number of signal readings used to compute A1 and A3
A3	the standard deviation of the mean baseline absorbance (A1)
A()	the sample beam test data array
A$	the response to a prompt
D3,D4	sample beam test parameters: the average reference beam and the average sample beam, respectively
D6,D7,D8	sample beam test CALL 7 parameters: initial delay (in clock ticks), sampling frequency (in clock ticks), and number of signals to be acquired, respectively
D0$	the date code for the Run File
E0	the entry/exit flag
F	the data acquisition frequency (clock ticks per second)
F3$	the name of the test injection plot list file
F4$	the name of the peak data file
F7$	the Run File name
H0,H2	the highest absorbance signal
H3	the column width for plot listing data
I	a counter and general-purpose variable
I$	a plot listing output character string
I0	the array position of the lowest absorbance signal
I0$	the plot list file output control character
I1	the array position offset of the peak absorbance from the highest absorbance
I2	the array position of the highest absorbance signal
I3	the array position of the peak absorbance (I2+I1)
I9	the array position of the highest absorbance signal
K	a general-purpose variable
K3	the tab position of an absorbance signal in plot listing
L0	the lowest absorbance signal
M1	the sequencing mode flag
M2	the data acquisiton mode flag
M3	a plot listing output device indicator
N0	the quantity of peak data points
N1	the quantity of leading baseline points
N2	the total number of data points
N3,N4	the starting and ending array positions of the peak
O$	the available plot output options
O1	a string position variable
O1$	a user-selected output option (O$)

TABLE 6 (Contd.)

P1,P2,P3	the zeroth, first and second degree quadratic coefficients of the least squares approximation
P$	the prefix for all programs and files
P0$	the previous program name (.02)
P1$	the current program name (.03)
P2$	the name of the program to be chained to (.04)
P3$	the ASCL router program name (.00)
R0$	the PARMETH code of the Run File
R1$	the analyst's initials
R2$	the analyte name
R3$	the concentration units
R4$	the instrument name
S1	the plot frequency
T0	the delay time (sec.) from "sense pulse" to atomization
T1	the user-supplied atomization time (sec.)
T2	the delay time (sec.) from "sense pulse" to data acquisition
T3	the time (sec.) for baseline data acquisition
T4	the time (sec.) for the total data acquisition
T9	a transmittance-to-absorbance conversion variable
U1	the maximum proportion of peak points out of total points
V1	the baseline-corrected peak absorbance
V2	the determined peak absorbance
V()	the raw peak data array
Z0	the channel for SYNC reset (HGA/NOVA)
Z1	the channel for NOVA ready-set
Z1$	the double/single channel indicator
Z2	the channel for "sense" reset
Z2$	the peak height indicator
Z3	the CALL 257 dummy accumulator
Z3$	the leading baseline indicator
Z4	the channel for CALL 7 without "sense"
Z4$	the sample type
Z5	the channel for CALL 7 with "sense"
Z6	the delay time (in clock ticks) before data acquisition
Z7	the sampling frequency (in clock ticks)
Z8	the quantity of available points in the CALL 7
Z9	the injection/measurement counter

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE  1
                 PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.03 - INSTRUMENT SETUP AND CHECKOUT        *
0040 REM *            FOR PE503,CRLV,RM000,FLAMELESS,J.MORRIS,GSC2   *
0050 REM *   BY: D.RYAN (UCCC), JULY 16, 1979                        *
0060 REM *   MOST RECENT REVISION: DECEMBER 27, 1979                 *
0061 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0062 LET E0=1
0063 ON ESC THEN GOTO 2482
0064 ESC
0069 ON ERR THEN STOP
0080 DIM R1$[4],R2$[2],R3$[8],R4$[16],P$[10],P1$[10],P2$[10]
0090 DIM Z1$[1],Z2$[1],Z3$[1],Z4$[10],R$[10],A$[1]
0100 DIM V[300],A[20]
0105 DIM I$[132]
0110 DIM F3$[10],F4$[10],D0$[20]
0112 LET P$="ISCN"
0114 LET P3$=P$,".00"
0120 IF E0=1 THEN GOTO 0250
0140 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0150 READ FILE[2,9],R1$,R2$,R3$,R4$
0160 READ FILE[2,15],M0,M1,R1,M2,M5
0170 LET P0$=P$,".02"
0175 LET P1$=P$,".03"
0180 LET P2$=P$,".04"
0190 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0200 LET I2=0
0220 GOTO 0330
0225 REM ENTRY FROM GSCN.02
0230 LET E0=0
0240 GOTO 0063
0250 LET R1$="XXXX"
0260 LET R2$="XX"
0270 LET R3$="XXXXXXXX"
0280 LET R4$="XXXXXXXXXXXXXXXX"
0290 LET M2=1
0300 LET M1=0
0320 LET R$="NONE USED"
0330 LET F3$=P$,".LP"
0340 LET F4$=P$,".PK"
0342 ON ERR THEN GOTO 0346
0344 DELETE F4$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE  2
                 PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0346 ON ERR THEN STOP
0350 REM  SYNC RESET (HGA/NOVA)
0360 LET Z0=24753
0370 REM  NOVA-READY SET
0380 LET Z1=24689
0390 REM  SENSE RESET
0400 LET Z2=25393
0410 REM  DUMMY ACCUMULATOR
0420 LET Z3=0
0430 REM  CHANNEL FOR CALL 7 WITHOUT SENSE
0440 LET Z4=1
0450 REM  CHANNEL FOR CALL 7 WITH SENSE
0460 LET Z5=0
0470 REM  FIRST INJECTION FLAG
0480 LET Z9=0
0490 REM  NUMBER OF POINTS CALLED
0500 LET Z8=300
0510 REM  TIME BETWEEN SENSE PULSE AND START OF ATOMIZATION
0520 LET T0=16.8
0530 REM  DATA ACQUISITION FREQUENCY
0540 LET F=60
0550 REM  MAXIMUM RATIO OF PEAK POINTS TO TOTAL POINTS
0560 LET U1=.8
0570 REM  NUMBER OF POINTS AFTER PEAK PROCESSING
0580 LET N2=Z8/2
0590 REM  DOUBLE OR SINGLE CHANNEL DATA REDUCTION
0600 LET Z1$="D"
0610 REM  PEAK HEIGHT
0620 LET Z2$="P"
0630 REM  LEADING BASELINE
0640 LET Z3$="L"
0650 REM  SAMPLE TYPE
0660 LET Z4$="TEST"
0662 REM FUTURE USE
0664 LET Z5$=""
0670 PRINT
0680 PRINT "SAMPLE BEAM TEST."
0690 PRINT
0700 LET D6=0
0710 LET D7=3
0720 LET D8=20
0730 CALL 7,Z4,D6,D7,D8,A[1]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE  3
                    PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0740 LET D3=0
0750 LET D4=0
0760 FOR I=1 TO 19 STEP 2
0770   LET D3=D3+A[I]
0780   LET D4=D4+A[I+1]
0790 NEXT I
0800 LET D3=D3/10
0810 LET D4=D4/10
0820 PRINT "REFERENCE BEAM = ";D3
0830 PRINT "SAMPLE BEAM    = ";D4
0840 PRINT "BEAM DIFFERENCE= ";D3-D4
0850 IF D3>500 THEN IF D3<15000 THEN IF D4>500 THEN IF D4<15000 THEN G
*    OTO 0910
0860 PRINT
0870 PRINT "<7>SOMETHING IS WRONG!"
0910 PRINT
0920 PRINT "ANOTHER BEAM TEST ([N] OR Y) ";
0925 ON ERR THEN GOTO 2920
0930 INPUT " > ",A$;
0935 ON ERR THEN STOP
0940 PRINT
0950 IF A$="Y" THEN GOTO 0670
0960 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 0910
0970 PRINT
0980 PRINT "ATOMIZATION TIME IN SECONDS ";
0985 ON ERR THEN GOTO 2920
0990 INPUT " > ",T1;
0995 ON ERR THEN STOP
1000 PRINT
1010 IF T1>0 THEN IF T1<=20 THEN GOTO 1040
1020 PRINT "<7>INVALID TIME! TRY AGAIN."
1030 GOTO 0970
1040 LET Z7=INT((T1*F)/(U1*N2))+1
1050 LET N0=INT(T1*F/Z7)
1060 LET N1=INT((N2-N0)/2)
1070 LET T3=Z7*N1/F
1080 LET T4=Z7*N2/F
1090 LET T2=T0-T3
1100 LET Z6=INT(T2*F)
1110 PRINT
1120 PRINT "DELAY TIME IS ";T2;" SECONDS."
1130 PRINT "TIME BETWEEN POINTS IS ";Z7;"/60 SECONDS."

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE  4
                    PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1140 PRINT "TOTAL DATA TAKING TIME IS ";T4;" SECONDS."
1150 PRINT
1160 PRINT "DO YOU WANT TO MAKE A TEST INJECTION ? ([N] OR Y) ";
1165 ON ERR THEN GOTO 2920
1170 INPUT " > ",A$;
1175 ON ERR THEN STOP
1180 PRINT
1190 IF A$="Y" THEN GOTO 1220
1200 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 1150
1210 GOTO 2370
1220 IF Z9>0 THEN GOTO 1250
1225 PRINT
1230 PRINT "PLACE A STANDARD IN THE CURRENT SAMPLING POSITION."
1240 PRINT
1250 IF Z9>0 THEN GOTO 1300
1260 CALL 257,Z0,Z3
1270 CALL 257,Z2,Z3
1280 PRINT "<7>*** START SAMPLER NOW. ***<7>"
1290 GOTO 1310
1300 CALL 257,Z1,Z3
1310 CALL 7,Z5,Z6,Z7,Z8,V[1]
1320 LET Z9=Z9+1
1330 PRINT
1340 FOR I=1 TO Z8 STEP 2
1350   LET T9=0
1360   ON ERR THEN GOTO 1380
1370   LET T9=LOG(V[I]/V[I+1])/2.30259
1380   ON ERR THEN STOP
1390   LET V[(I+1)/2]=T9
1400 NEXT I
1410 LET L0=V[1]
1420 LET H0=V[1]
1430 FOR I=1 TO N2
1440   IF L0<V[I] THEN GOTO 1470
1450   LET L0=V[I]
1460   LET I0=I
1470   IF H0>V[I] THEN GOTO 1500
1480   LET H0=V[I]
1490   LET I9=I
1500 NEXT I
1510 LET A1=0
1520 LET A2=0

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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(4-76)

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```
   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                         PAGE  5
                    PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1530 LET A3=0
1540 FOR I=1 TO N1
1550   IF V[I]=0 THEN GOTO 1590
1560   LET A2=A2+1
1570   LET A1=A1+V[I]
1590 NEXT I
1600 LET A1=A1/A2
1602 FOR I=1 TO N1
1604   IF V[I]=0 THEN GOTO 1608
1606   LET A3=A3+(V[I]-A1)^2
1608 NEXT I
1610 LET A3=SQR(A3/(A2-1))
1620 LET K=0
1630 LET N3=N1+1
1640 FOR I=N1+1 TO N0+N1
1650   IF V[I]<A1+2*A3 THEN GOTO 1680
1660   LET K=K+1
1670   IF V[I]<V[I+1] THEN IF V[I+1]<V[I+2] THEN IF V[I+2]<V[I+3] THEN
*     GOTO 1730
1680 NEXT I
1690 IF K>0 THEN GOTO 1740
1700 LET H2=H0
1710 LET I2=I9
1715 PRINT "<7>       LEADING EDGE OF PEAK UNDETECTABLE"
1720 GOTO 1870
1730 LET N3=I
1740 LET N4=N0+N1
1750 FOR I=N3 TO N0+N1
1760   IF V[I]>V[I+1] THEN IF V[I+1]>V[I+2] THEN IF V[I+2]>V[I+3] THEN
*     GOTO 1790
1770 NEXT I
1780 GOTO 1800
1790 LET N4=I+2
1800 LET H2=L0
1810 FOR I=N3 TO N4
1820   IF V[I]<=H2 THEN GOTO 1850
1830   LET H2=V[I]
1840   LET I2=I
1850 NEXT I
1860 IF V[I2]>A1+5*A3 THEN GOTO 1910
1870 PRINT "PEAK ABSORBANCE WILL BE DETERMINED FROM MAXIMUM SIGNAL."
1880 LET V2=V[I2]/2+V[I2-1]/4+V[I2+1]/4

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                         PAGE  6
                    PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1890 LET I1=0
1900 GOTO 1960
1910 LET P1=(-3*(V[I2-2]+V[I2+2])+12*(V[I2-1]+V[I2+1])+17*V[I2])/35
1920 LET P2=(2*(V[I2+2]-V[I2-2])+V[I2+1]-V[I2-1])/10
1930 LET P3=(2*(V[I2+2]+V[I2-2])-(V[I2+1]+V[I2-1])-2*V[I2])/14
1940 LET I1=P2/(-2*P3)
1941 IF (ABS(I1))>2 THEN PRINT "<7>       UNUSUAL (FLAT OR NOISY) PEAK"
1942 IF (ABS(I1))>2 THEN GOTO 1870
1950 LET V2=P1+P2*I1+P3*I1*I1
1960 LET I3=I2+I1
1970 LET V1=V2-A1
1972 PRINT
1974 PRINT "PK HT = ";V2;"    PK LOC = ";I3
1976 PRINT "BSLN  = ";A1;"    ST DEV = ";A3;"    TRUE = ";V1
1978 PRINT
1980 OPEN FILE[4,2],F4$
1990 WRITE FILE[4],SYS(2),SYS(1),SYS(3),SYS(11),SYS(12),SYS(13)
2000 WRITE FILE[4],R1$,R2$,R3$,R4$,P$
2010 WRITE FILE[4],Z1$,Z2$,Z3$,Z4$,Z5$
2020 WRITE FILE[4],Z5,Z6,Z7,Z8,N2,N1,H0,L0,E0,E1,0,0,0
2030 WRITE FILE[4],I0,I1,I2,I3,V1,A1,V2,M1,A3,0,0,0,0
2040 MAT WRITE FILE[4],V
2050 CLOSE FILE[4]
2060 LET H3=55
2070 PRINT
2071 PRINT "PLOT FREQUENCY (0 FOR NO PLOT) ";
2072 ON ERR THEN GOTO 2920
2073 INPUT " > ",S1;
2074 ON ERR THEN STOP
2075 PRINT
2076 IF S1=0 THEN GOTO 2360
2078 IF S1=INT(ABS(S1)) THEN IF S1<100 THEN GOTO 2080
2079 GOTO 2070
2080 OPEN FILE[3,1],F3$,80
2090 PRINT FILE[3]
2100 PRINT FILE[3],"  CRUDE FLAMELESS AA PEAK PLOT"
2110 PRINT FILE[3]
2120 PRINT FILE[3],USING " DATE: ##/##/####               TIME: ##:##:#
*    #",SYS(2),SYS(1),SYS(3),SYS(11),SYS(12),SYS(13)
2130 PRINT FILE[3]
2140 FOR I=1 TO N2 STEP S1
2150   LET K3=INT(H3*(V[I]-L0)/(H0-L0)+.5)

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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```
STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                              PAGE  7
             PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2155   PRINT FILE[3],USING "### ",I;
2160   PRINT FILE[3], TAB(K3+1);"*";V[I]
2170 NEXT I
2180 PRINT FILE[3]
2190 CLOSE FILE[3]
2200 LET O$="HTLBN"
2202 PRINT
2204 PRINT "CRUDE PLOT OUTPUT OPTIONS: ";O$;
2206 ON ERR THEN GOTO 2920
2208 INPUT " > ",O1$;
2210 ON ERR THEN STOP
2212 PRINT
2214 IF O1$<>"H" THEN IF LEN(O1$)<>0 THEN GOTO 2216
2215 GOTO 2222
2216 IF LEN(O1$)=1 THEN GOTO 2219
2217 PRINT "<7>";
2218 GOTO 2202
2219 LET O1=POS(O$,O1$,1)
2220 IF O1>0 THEN GOTO 2234
2221 GOTO 2217
2222 PRINT "  H - HELP"
2224 PRINT "  T - TERMINAL ONLY"
2226 PRINT "  L - LINEPRINTER ONLY"
2228 PRINT "  B - BOTH T AND L"
2230 PRINT "  N - NEITHER T NOR L"
2234 LET M3=O1-2
2310 IF M3=3 THEN GOTO 2360
2330 IF M3<>0 THEN IF M3<>1 THEN IF M3<>2 THEN GOTO 2200
2340 OPEN FILE[3,3],F3$,80
2350 GOSUB 2690
2355 CLOSE FILE[3]
2360 PRINT
2370 PRINT
2380 PRINT "DO YOU WANT TO CHANGE TIMING PARAMETERS ";
2385 ON ERR THEN GOTO 2920
2390 INPUT " > ",A$;
2395 ON ERR THEN STOP
2400 PRINT
2410 IF A$="Y" THEN GOTO 0970
2420 IF Z9=0 THEN GOTO 2480
2430 PRINT
2440 PRINT "DO YOU WANT TO MAKE ANOTHER TEST INJECTION ";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                              PAGE  8
             PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2445 ON ERR THEN GOTO 2920
2450 INPUT " > ",A$;
2455 ON ERR THEN STOP
2460 PRINT
2470 IF A$="Y" THEN GOTO 1220
2480 IF E0<>1 THEN GOTO 2490
2482 CLOSE
2483 NOESC
2484 ON ERR THEN GOTO 2486
2485 CHAIN P3$
2486 ON ERR THEN STOP
2487 ESC
2488 STOP
2490 IF Z9>=1 THEN GOTO 2590
2500 LET I2=105
2590 WRITE FILE[2,16],Z0,Z1,Z2,Z3,Z5,Z6
2600 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,I2
2610 WRITE FILE[2,18],Z1$,Z2$,Z3$,Z4$,Z5$
2620 WRITE FILE[2,19],T0,T1,T2,T4,U1,Z4,M3
2630 ON ERR THEN GOTO 2650
2640 CHAIN P2$
2650 ON ERR THEN STOP
2660 GOTO 2482
2670 REM [       PRINT  SUBROUTINE          ]
2680 REM ***********************************
2690 IF M3=0 THEN GOTO 2780
2700 GOTO 2740
2710 PRINT "X";
2720 IF SYS(7)<>-48 THEN STOP
2730 DELAY =2.3
2740 ON ERR THEN GOTO 2710
2750 OPEN FILE[6,1],"$LPT"
2760 ON ERR THEN STOP
2770 PRINT
2780 FOR I=1 TO 1000
2790   LREAD FILE[3],I$,I0$
2800   IF EOF(3)=1 THEN GOTO 2870
2810   LET I$=I$,I0$
2820   IF M3=0 THEN GOTO 2850
2830   PRINT FILE[6],I$;
2840   IF M3=1 THEN GOTO 2860
2850   PRINT I$;

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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(6-78)

```
  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                  PAGE  9
                  PROGRAM LISTING FOR C000G50303.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2860 NEXT I
2870 IF M3=0 THEN GOTO 2890
2880 CLOSE FILE[6]
2890 RETURN
2900 REM [   ERROR/RETRY  SEGMENT          ]
2910 REM ++++++++++++++++++++++++++++++++++++
2920 PRINT "<7> ";
2930 RETRY




























1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                     PAGE 10
                    SYMBOL TABLE FOR C000G50303.AS

SYMBOL    REFERENCES
------    ------------------------------------------------------------
 0063  0240
 0250  0120
 0330  0220
 0346  0342
 0670  0950
 0910  0850  0960
 0970  1030  2410
 1040  1010
 1150  1200
 1220  1190  2470
 1250  1220
 1300  1250
 1310  1290
 1380  1360
 1470  1440
 1500  1470
 1590  1550
 1608  1604
 1680  1650
 1730  1670
 1740  1690
 1790  1760
 1800  1780
 1850  1820
 1870  1720  1942
 1910  1860
 1960  1900
 2070  2079
 2080  2078
 2200  2330
 2202  2218
 2216  2214
 2217  2221
 2219  2216
 2222  2215
 2234  2220
 2360  2076  2310
 2370  1210
 2480  2420
 2482  0063  2660
 2486  2484
 2490  2480
 2590  2490
 2650  2630
 2690  2350
```

TYPING GUIDE SHEET
BEGIN FIRST LINE OF TEXT HERE
DROPPED HEAD BEGIN SECTIONS HERE
CENTER OF PAGE
TOP OF IMAGE AREA
BEGIN LAST LINE OF TEXT
BOTTOM OF IMAGE AREA; OUTSIDE DIMENSION FOR TABLES AND ILLUSTRATIONS
PAGE NUMBER
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```
      STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                          PAGE 11
                    SYMBOL TABLE FOR C000G50303.AS

SYMBOL   REFERENCES
------   ---------------------------------------------------------------
 2710    2740
 2740    2700
 2780    2690
 2850    2820
 2860    2840
 2870    2800
 2890    2870
 2920    0925  0985  1165  2072  2206  2385  2445
 A$      0090  0930  0950  0960  1170  1190  1200  2390  2410  2450
         2470
 A1      1510  1570  1600  1606  1650  1860  1970  1976  2030
 A2      1520  1560  1600  1610
 A3      1530  1606  1610  1650  1860  1976  2030
 A[      0100  0730  0770  0780
 D0$     0110  0140  0190
 D3      0740  0770  0800  0820  0840  0850
 D4      0750  0780  0810  0830  0840  0850
 D6      0700  0730
 D7      0710  0730
 D8      0720  0730
 E0      0062  0120  0230  2020  2480
 E1      2020
 F       0540  1040  1050  1070  1080  1100
 F3$     0110  0330  2080  2340
 F4$     0110  0340  0344  1980
 F7$     0140  0190
 FL#2    0140  0150  0160  0190  2590  2600  2610  2620
 FL#3    2080  2090  2100  2110  2120  2130  2155  2160  2180  2190
         2340  2355  2790
 FL#4    1980  1990  2000  2010  2020  2030  2040  2050
 FL#6    2750  2830  2880
 H0      1420  1470  1480  1700  2020  2150
 H2      1700  1800  1820  1830
 H3      2060  2150
 I       0760  0770  0780  0790  1340  1370  1390  1400  1430  1440
         1450  1460  1470  1480  1490  1500  1540  1550  1570  1590
         1602  1604  1606  1608  1640  1650  1670  1680  1730  1750
         1760  1770  1790  1810  1820  1830  1840  1850  2140  2150
         2155  2160  2170  2780  2860
 I$      0105  2790  2810  2830  2850
 I0      1460  2030
 I0$     2790  2810
 I1      1890  1940  1941  1942  1950  1960  2030
 I2      0200  1710  1840  1860  1880  1910  1920  1930  1960  2030
         2500  2600
```

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      STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                          PAGE 12
                    SYMBOL TABLE FOR C000G50303.AS

SYMBOL   REFERENCES
------   ---------------------------------------------------------------
 I3      1960  1974  2030
 I9      1490  1710
 K       1620  1660  1690
 K3      2150  2160
 L0      1410  1440  1450  1800  2020  2150
 M0      0160
 M1      0160  0300  2030
 M2      0160  0290
 M3      2234  2310  2330  2620  2690  2820  2840  2870
 M5      0160
 N0      1050  1060  1640  1740  1750  2600
 N1      1060  1070  1540  1602  1630  1640  1740  1750  2020  2600
 N2      0580  1040  1060  1080  1430  2020  2140  2600
 N3      1630  1730  1750  1810
 N4      1740  1790  1810
 O$      2200  2204  2219
 O1      2219  2220  2234
 O1$     2208  2214  2216  2219
 P$      0080  0112  0114  0140  0170  0175  0180  0190  0330  0340
         2000
 P0$     0140  0170  0190
 P1      1910  1950
 P1$     0080  0140  0175  0190
 P2      1920  1940  1950
 P2$     0080  0140  0180  0190  2640
 P3      1930  1940  1950
 P3$     0114  2485
 R$      0090  0320
 R0$     0140  0190
 R1      0160
 R1$     0080  0150  0250  2000
 R2$     0080  0150  0260  2000
 R3$     0080  0150  0270  2000
 R4$     0080  0150  0280  2000
 S1      2073  2076  2078  2140
 T0      0520  1090  2620
 T1      0990  1010  1040  1050  2620
 T2      1090  1100  1120  2620
 T3      1070  1090
 T4      1080  1140  2620
 T9      1350  1370  1390
 U1      0560  1040  2620
 V       2040
 V1      1970  1976  2030
 V2      1880  1950  1970  1974  2030
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                     PAGE 13
                        SYMBOL TABLE FOR C000G50303.AS

SYMBOL    REFERENCES
------    -----------------------------------------------------------
 V[       0100  1310  1370  1390  1410  1420  1440  1450  1470  1480
          1550  1570  1604  1606  1650  1670  1760  1820  1830  1860
          1880  1910  1920  1930  2150  2160
 Z0       0360  1260  2590
 Z1       0380  1300  2590
 Z1$      0090  0600  2010  2610
 Z2       0400  1270  2590
 Z2$      0090  0620  2010  2610
 Z3       0420  1260  1270  1300  2590
 Z3$      0090  0640  2010  2610
 Z4       0440  0730  2620
 Z4$      0090  0660  2010  2610
 Z5       0460  1310  2020  2590
 Z5$      0664  2010  2610
 Z6       1100  1310  2020  2590
 Z7       1040  1050  1070  1080  1130  1310  2020  2600
 Z8       0500  0580  1310  1340  2020  2600
 Z9       0480  1220  1250  1320  2420  2490  2600
```

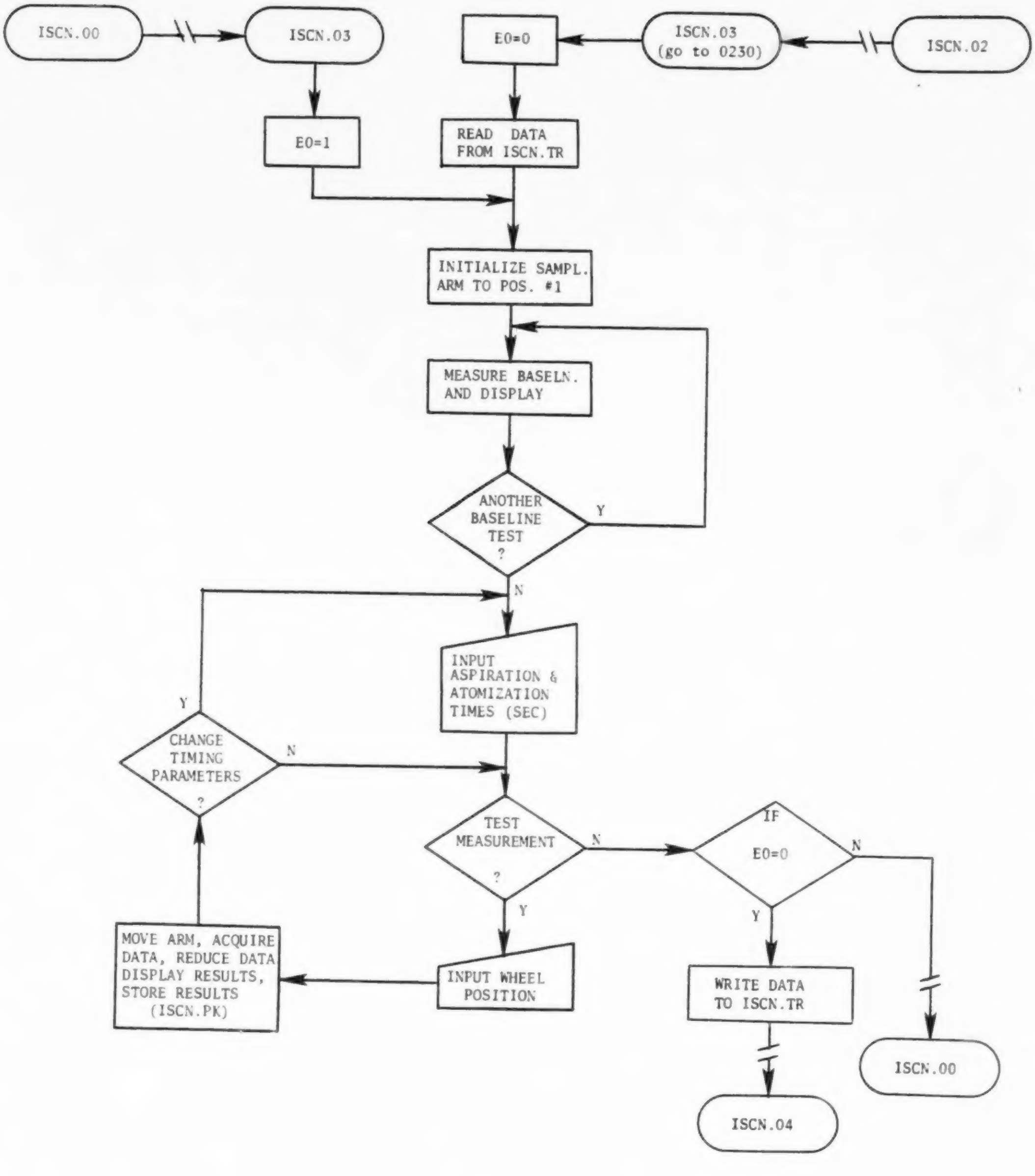
ISCN.00
ISCN.03
E0=1
E0=0
READ DATA FROM ISCN.TR
ISCN.03 (go to 0230)
ISCN.02
INITIALIZE SAMPL. ARM TO POS. #1
MEASURE BASELN. AND DISPLAY
ANOTHER BASELINE TEST ?
Y
N
INPUT ASPIRATION & ATOMIZATION TIMES (SEC)
Y
CHANGE TIMING PARAMETERS ?
N
TEST MEASUREMENT ?
N
IF E0=0
N
Y
Y
MOVE ARM, ACQUIRE DATA, REDUCE DATA DISPLAY RESULTS, STORE RESULTS (ISCN.PK)
INPUT WHEEL POSITION
WRITE DATA TO ISCN.TR
ISCN.00
ISCN.04

Figure 8. Program ISCN.03 -- Instrument checkout module for Varian AA-5/AA-6 flame adaptation.

TABLE 7. SYMBOL DEFINITIONS FOR ISCN.03 FOR VARIAN AA-5/AA-6 FLAME ADAPTATION

A1	the mean absorbance
A2	the number of signal readings used to compute A1 and A3
A3	the standard deviation of the mean absorbance (A1)
A$	the response to a prompt
B9	the baseline absorbance
D3	the average baseline signal
D5	the average baseline absorbance
D6,D7,D8	baseline measurement CALL 7 parameters: initial delay (in clock ticks), sampling frequency (in clock ticks), and number of signals to be acquired, respectively
D0$	the date code for the Run File
E0	the entry/exit flag
F	the data acquisition frequency (clock ticks per second)
F4$	the name of the peak data file
F7$	the name of the Run File
H0	the highest absorbance signal
I	a counter and general-purpose variable
I0	the array position of the lowest absorbance signal
I9	the array position of the highest absorbance signal
K	the number of outliers
L0	the lowest absorbance signal
M1	the sequencing mode flag
M2	the data acquisition mode flag
N2	the total number of data points
P$	the prefix for all programs and files
P0$	the previous program name (.02)
P1$	the current program name (.03)
P2$	the name of the program to be CHAINed to (.04)
P3$	the ASCL router program name (.00)
R0$	the PARMETH code of the Run File
R1$	the analyst's initials
R2$	the analyte name
R3$	the concentration units
R4$	the instrument name
T1	the user-supplied sampling time (in seconds)
T9	a transmittance-to-absorbance conversion variable
V1	the baseline-corrected peak absorbance
V2	the determined peak absorbance
V()	the raw peak data array
W1	the user-defined wheel position of a test measurement

TABLE 7 (Contd.)

Z1$	the double/single channel indicator
Z2	the sample aspiration-to-atomization lag time (in seconds)
Z3	the channel number of the automatic sampler
Z4	the CALL 21/22 function/position number
Z4$	the sample type
Z5	the channel for CALL 7 without "sense"
Z6	the sample aspiration-to-atomization lag time (in clock ticks)
Z7	the sampling frequency (in clock ticks)
Z8	the quantity of available points in the CALL 7
Z9	the injection/measurement counter

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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE  1
                   PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.03 - INSTRUMENT SETUP AND CHECKOUT        *
0040 REM *            FOR AA6, ANNAPOLIS-REGION 3, FLAME, FSC2       *
0050 REM *   BY: D.RYAN (UCCC), JULY 16, 1979                        *
0060 REM *   MOST RECENT REVISION: MAY 1, 1981                       *
0061 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0062 LET E0=1
0063 ON ESC THEN GOTO 5450
0064 ESC
0069 ON ERR THEN STOP
0080 DIM R1$[4],R2$[2],R3$[8],R4$[16],P$[10],P1$[10],P2$[10]
0090 DIM Z1$[1],Z2$[1],Z3$[1],Z4$[10],R$[10],A$[1]
0100 DIM V[300]
0105 DIM I$[132]
0110 DIM F3$[10],F4$[10],D0$[20]
0112 LET P$="ISCN"
0114 LET P3$=P$,".00"
0120 IF E0=1 THEN GOTO 0250
0140 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0150 READ FILE[2,9],R1$,R2$,R3$,R4$
0160 READ FILE[2,15],M0,M1,R1,M2,M5
0170 LET P0$=P$,".02"
0175 LET P1$=P$,".03"
0180 LET P2$=P$,".04"
0190 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0200 LET I2=0
0220 GOTO 0330
0225 REM ENTRY FROM ISCN.02
0230 LET E0=0
0240 GOTO 0063
0250 LET R1$="XXXX"
0260 LET R2$="XX"
0270 LET R3$="XXXXXXXX"
0280 LET R4$="XXXXXXXXXXXXXXXX"
0290 LET M2=1
0300 LET M1=0
0320 LET R$="NONE USED"
0330 LET F3$=P$,".LP"
0340 LET F4$=P$,".PK"
0342 ON ERR THEN GOTO 0346
0344 DELETE F4$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE  2
                   PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0346 ON ERR THEN STOP
0450 REM FREE VARIABLE
0470 LET Z0=0
0490 REM FREE VARIABLE
0510 LET Z1=0
0530 REM SAMPLE ASPIRATION-TO-ATOMIZATION LAG TIME
0550 LET Z2=0
0570 REM CHANNEL FOR SAMPLE CHANGER
0590 LET Z3=1
0610 REM CALL 21/22 FUNCTION/POSITION NUMBER
0630 LET Z4=0
0650 REM CHANNEL FOR CALL 7 DATA ACQUISITION
0670 LET Z5=5
0690 REM  FIRST INJECTION FLAG
0710 LET Z9=0
0730 REM  NUMBER OF POINTS CALLED
0750 LET Z8=120
0770 REM  ATOMIZATION TIME
0790 LET T1=0
0810 REM  DATA-ACQUISITION FREQUENCY (TICKS/SEC.)
0830 LET F=60
0850 REM
0870 LET U1=0
0890 REM
0910 LET N2=Z8
0930 REM  DOUBLE OR SINGLE CHANNEL DATA REDUCTION
0950 LET Z1$="S"
0970 REM
0990 LET Z2$=""
1010 REM
1030 LET Z3$=""
1050 REM  SAMPLE TYPE
1070 LET Z4$="TEST"
1090 REM FUTURE USE
1110 LET Z5$=""
1130 PRINT
1150 PRINT "SET SAMPLER ARM AT POSITION #1 AND";
1170 ON ERR THEN GOTO 5790
1190 INPUT " PRESS RETURN  > ",A$
1210 ON ERR THEN STOP
1230 LET A1=0
1250 LET A2=1

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE  3
                PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1270 CALL 22,Z3,A1
1290 CALL 21,Z3,A2
1310 PRINT
1330 PRINT "PREPARE TO MEASURE BASELINE FOR FIVE (5) SECONDS."
1350 PRINT "ENTER SAMPLE WHEEL POSITION ";
1370 ON ERR THEN GOTO 5790
1390 INPUT " > ",W1;
1410 ON ERR THEN STOP
1430 LET Z4=W1-INT((W1-1)/40)*40
1450 IF Z4>0 THEN IF Z4<=40 THEN IF Z4=INT(Z4) THEN GOTO 1510
1470 PRINT "<7> INVALID NUMBER"
1490 GOTO 1350
1510 PRINT
1530 ON ERR THEN GOTO 5790
1550 INPUT "PRESS RETURN TO BEGIN ASPIRATION > ",A$
1570 ON ERR THEN STOP
1590 ON ESC THEN GOTO 2410
1610 LET A1=Z4
1630 CALL 22,Z3,A1
1650 ON ESC THEN GOTO 5450
1652 PRINT
1654 ON ERR THEN GOTO 5790
1656 INPUT "PRESS RETURN TO BEGIN BASELINE MEASUREMENT > ",A$
1658 ON ERR THEN STOP
1670 LET D6=0
1690 LET D7=3
1710 LET D8=100
1730 LET A2=1
1750 CALL 7,Z5,D6,D7,D8,V[1]
1770 CALL 21,Z3,A2
1790 PRINT
1810 LET D3=0
1830 LET D4=0
1850 LET D5=0
1870 FOR I=1 TO 100
1890   LET D3=D3+V[I]
1910   LET T9=0
1930   ON ERR THEN GOTO 1970
1950   LET T9=LOG(14000/V[I])/2.30259
1970   ON ERR THEN STOP
1990   LET D5=D5+T9
2010 NEXT I

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE  4
                PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2030 LET D3=D3/100
2050 LET D5=D5/100
2070 PRINT "SAMPLE BEAM    = ";D3
2090 PRINT "BASELINE VALUE = ";D5
2110 IF D3>500 THEN IF D3<15000 THEN GOTO 2170
2130 PRINT
2150 PRINT "<7>SOMETHING IS WRONG!"
2170 PRINT
2190 PRINT "ANOTHER BASELINE TEST ?  ([N] OR Y) ";
2210 ON ERR THEN GOTO 5790
2230 INPUT " > ",A$;
2250 ON ERR THEN STOP
2270 PRINT
2290 IF A$="Y" THEN GOTO 1310
2310 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 2170
2330 LET B9=D5
2350 PRINT "BASELINE= ";B9
2370 GOTO 2530
2390 REM [ESCAPE DURING BASELINE ASPIRATION]
2410 NOESC
2430 LET A2=1
2450 CALL 21,Z3,A2
2470 ON ESC THEN GOTO 5450
2490 ESC
2510 GOTO 1310
2530 PRINT
2550 PRINT "SAMPLE ASPIRATION-TO-ATOMIZATION LAG TIME IN SECONDS ";
2570 ON ERR THEN GOTO 5790
2590 INPUT " > ",Z2;
2610 ON ERR THEN STOP
2630 IF Z2<=0 THEN PRINT "<7>"
2650 IF Z2<=0 THEN GOTO 2530
2670 PRINT
2690 PRINT "SAMPLING TIME IN SECONDS ";
2710 ON ERR THEN GOTO 5790
2730 INPUT " > ",T1;
2750 ON ERR THEN STOP
2770 PRINT
2790 IF T1>=.5 THEN IF T1<=20 THEN GOTO 2842
2810 PRINT "<7>INVALID TIME! TRY AGAIN."
2830 GOTO 2670
2842 LET N2=Z8+10

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         0         0         0         0         0         0         0
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    STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
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                      PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2844 LET N2=N2-10
2850 LET Z7=INT(T1*F/N2+.0001)
2870 IF Z7=0 THEN GOTO 2844
2890 LET T1=Z7*N2/F
2910 LET Z6=Z2*F
2930 PRINT
2950 PRINT "TOTAL DATA ACQUISITION TIME IS";(T1+Z2);"SECONDS."
2970 PRINT
2990 PRINT "DO YOU WANT TO MAKE A TEST MEASUREMENT ? ([N] OR Y) ";
3010 ON ERR THEN GOTO 5790
3030 INPUT " > ",A$;
3050 ON ERR THEN STOP
3070 PRINT
3090 IF A$="Y" THEN GOTO 3150
3110 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 2970
3130 GOTO 5090
3150 PRINT
3170 PRINT "ENTER SAMPLE WHEEL POSITION ";
3190 ON ERR THEN GOTO 5790
3210 INPUT " > ",W1;
3230 ON ERR THEN STOP
3250 LET Z4=W1-INT((W1-1)/40)*40
3270 IF Z4>0 THEN IF Z4<=40 THEN IF Z4=INT(Z4) THEN GOTO 3330
3290 PRINT "<7> INVALID NUMBER"
3310 GOTO 3170
3330 PRINT
3350 PRINT "PREPARE TO MEASURE A SAMPLE."
3370 ON ERR THEN GOTO 5790
3390 INPUT "PRESS RETURN WHEN READY > ",A$
3410 ON ERR THEN STOP
3420 REM --- DATA ACQ/REDUC SUBRT
3430 MAT V=ZER
3450 REM [MOVE ARM AND ASPIRATE]
3470 LET A1=Z4
3490 LET A2=Z6
3510 LET A3=N2
3530 ON ESC THEN GOTO 4810
3550 CALL 22,Z3,A1
3570 REM [WAIT AND COLLECT DATA]
3590 ON ESC THEN GOTO 3650
3610 CALL 7,Z5,A2,Z7,A3,V[1]
3630 REM [RAISE ARM TO STOP ASPIRATION]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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    STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                        PAGE  6
                      PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3650 LET A1=1
3670 CALL 21,Z3,A1
3690 ON ESC THEN GOTO 5450
3710 LET Z9=Z9+1
3730 PRINT
3750 FOR I=1 TO Z8
3770   LET T9=0
3790   ON ERR THEN GOTO 3830
3810   LET T9=LOG(14000/V[I])/2.30259
3830   ON ERR THEN STOP
3850   LET V[I]=T9
3870 NEXT I
3890 LET L0=V[1]
3910 LET H0=V[1]
3930 FOR I=1 TO N2
3950   IF L0<V[I] THEN GOTO 4010
3970   LET L0=V[I]
3990   LET I0=I
4010   IF H0>V[I] THEN GOTO 4070
4030   LET H0=V[I]
4050   LET I9=I
4070 NEXT I
4090 LET A1=0
4110 LET A2=0
4130 LET A3=0
4150 FOR I=1 TO N2
4170   IF V[I]=0 THEN GOTO 4230
4190   LET A2=A2+1
4210   LET A1=A1+V[I]
4230 NEXT I
4250 LET A1=A1/A2
4270 LET V2=A1
4290 FOR I=1 TO N2
4310   IF V[I]=0 THEN GOTO 4350
4330   LET A3=A3+(V[I]-A1)^2
4350 NEXT I
4370 LET A3=SQR(A3/(A2-1))
4390 LET K=0
4410 FOR I=1 TO N2
4430   IF V[I]>A1+3*A3 THEN LET K=K+1
4450   IF V[I]<A1-3*A3 THEN LET K=K+1
4470 NEXT I

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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  STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
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              PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4490 LET V1=V2-B9
4510 PRINT
4530 PRINT "MEAN MEAS = ";V2;"     STD DEV = ";A3
4550 PRINT "BASELINE =  ";B9;"     TRUE ABS= ";V1
4570 IF K<>0 THEN PRINT "<7>OUTLIERS = ";K
4590 PRINT
4610 OPEN FILE[4,2],F4$
4630 WRITE FILE[4],SYS(2),SYS(1),SYS(3),SYS(11),SYS(12),SYS(13)
4650 WRITE FILE[4],R1$,R2$,R3$,R4$,P$
4670 WRITE FILE[4],Z1$,Z2$,Z3$,Z4$,Z5$
4690 WRITE FILE[4],Z5,Z6,Z7,Z8,N2,N1,H0,L0,E0,E1,0,0,0
4710 WRITE FILE[4],I0,I1,I2,I3,V1,A1,V2,M1,A3,0,0,0,0
4730 MAT WRITE FILE[4],V
4750 CLOSE FILE[4]
4770 GOTO 5090
4790 REM [ESCAPE DURING ASPIRATION]
4810 NOESC
4820 PRINT "<7>"
4830 LET A2=1
4850 CALL 21,Z3,A2
4870 ON ESC THEN GOTO 5450
4890 ESC
4910 PRINT
4930 PRINT "SET SAMPLER ARM AT POSITION #1 AND";
4950 ON ERR THEN GOTO 4950
4970 INPUT " PRESS RETURN  > ",A$
4990 ON ERR THEN STOP
5010 LET A1=0
5030 LET A2=1
5050 CALL 22,Z3,A1
5070 CALL 21,Z3,A2
5090 PRINT
5110 PRINT "DO YOU WANT TO CHANGE TIMING PARAMETERS ";
5130 ON ERR THEN GOTO 5790
5150 INPUT " > ",A$;
5170 ON ERR THEN STOP
5190 PRINT
5210 IF A$="Y" THEN GOTO 2530
5230 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 5270
5250 IF Z9=0 THEN GOTO 5430
5270 PRINT
5290 PRINT "DO YOU WANT TO MAKE ANOTHER TEST MEASUREMENT ([N] OR Y) ";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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  STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                                PAGE  8
              PROGRAM LISTING FOR A000FAA603.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
5310 ON ERR THEN GOTO 5790
5330 INPUT " > ",A$;
5350 ON ERR THEN STOP
5370 PRINT
5390 IF A$="Y" THEN GOTO 3150
5410 IF A$<>"N" THEN IF LEN(A$)<>0 THEN GOTO 5270
5430 IF E0<>1 THEN GOTO 5590
5450 CLOSE
5470 NOESC
5490 ON ERR THEN GOTO 5530
5510 CHAIN P3$
5530 ON ERR THEN STOP
5550 ESC
5570 STOP
5590 WRITE FILE[2,16],Z0,Z1,Z2,Z3,Z5,Z6
5610 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,B9
5630 WRITE FILE[2,18],Z1$,Z2$,Z3$,Z4$,Z5$
5650 WRITE FILE[2,19],T0,T1,T2,T4,U1,Z4,M3
5670 ON ERR THEN GOTO 5710
5690 CHAIN P2$
5710 ON ERR THEN STOP
5730 GOTO 5450
5750 REM [   ERROR/RETRY  SEGMENT          ]
5770 REM ++++++++++++++++++++++++++++++++++
5790 PRINT "<7> ";
5810 RETRY

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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      STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                                      PAGE  9
                     SYMBOL TABLE FOR A000FAA603.AS
SYMBOL   REFERENCES
------  ------------------------------------------------------------
 0063   0240
 0250   0120
 0330   0220
 0346   0342
 1310   2290  2510
 1350   1490
 1510   1450
 1970   1930
 2170   2110  2310
 2410   1590
 2530   2370  2650  5210
 2670   2830
 2842   2790
 2844   2870
 2970   3110
 3150   3090  5390
 3170   3310
 3330   3270
 3650   3590
 3830   3790
 4010   3950
 4070   4010
 4230   4170
 4350   4310
 4810   3530
 4950   4950
 5090   3130  4770
 5270   5230  5410
 5430   5250
 5450   0063  1650  2470  3690  4870  5730
 5530   5490
 5590   5430
 5710   5670
 5790   1170  1370  1530  1654  2210  2570  2710  3010  3190  3370
        5130  5310
 A$     0090  1190  1550  1656  2230  2290  2310  3030  3090  3110
        3390  4970  5150  5210  5230  5330  5390  5410
 A1     1230  1270  1610  1630  3470  3550  3650  3670  4090  4210
        4250  4270  4330  4430  4450  4710  5010  5050
 A2     1250  1290  1730  1770  2430  2450  3490  3610  4110  4190
        4250  4370  4830  4850  5030  5070
 A3     3510  3610  4130  4330  4370  4430  4450  4530  4710

 B9     2330  2350  4490  4550  5610
 D0$    0110  0140  0190
```

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      STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
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                     SYMBOL TABLE FOR A000FAA603.AS
SYMBOL   REFERENCES
------  ------------------------------------------------------------
 D3     1810  1890  2030  2070  2110
 D4     1830
 D5     1850  1990  2050  2090  2330
 D6     1670  1750
 D7     1690  1750
 D8     1710  1750
 E0     0062  0120  0230  4690  5430
 E1     4690
 F      0830  2850  2890  2910
 F3$    0110  0330
 F4$    0110  0340  0344  4610
 F7$    0140  0190
 FL#2   0140  0150  0160  0190  5590  5610  5630  5650
 FL#4   4610  4630  4650  4670  4690  4710  4730  4750
 H0     3910  4010  4030  4690
 I      1870  1890  1950  2010  3750  3810  3850  3870  3930  3950
        3970  3990  4010  4030  4050  4070  4150  4170  4210  4230
        4290  4310  4330  4350  4410  4430  4450  4470
 I$     0105
 I0     3990  4710
 I1     4710
 I2     0200  4710
 I3     4710
 I9     4050
 K      4390  4430  4450  4570
 L0     3890  3950  3970  4690
 M0     0160
 M1     0160  0300  4710
 M2     0160  0290
 M3     5650
 M5     0160
 N0     5610
 N1     4690  5610
 N2     0910  2842  2844  2850  2890  3510  3930  4150  4290  4410
        4690  5610
 P$     0080  0112  0114  0140  0170  0175  0180  0190  0330  0340
        4650
 P0$    0140  0170  0190
 P1$    0080  0140  0175  0190
 P2$    0080  0140  0180  0190  5690
 P3$    0114  5510
 R$     0090  0320
 R0$    0140  0190
 R1     0160
 R1$    0080  0150  0250  4650
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   STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
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                  SYMBOL TABLE FOR A000FAA603.AS

SYMBOL   REFERENCES
------   ------------------------------------------------------------
 R2$     0080  0150  0260  4650
 R3$     0080  0150  0270  4650
 R4$     0080  0150  0280  4650
 T0      5650
 T1      0790  2730  2790  2850  2890  2950  5650
 T2      5650
 T4      5650
 T9      1910  1950  1990  3770  3810  3850
 U1      0870  5650
 V       3430  4730
 V1      4490  4550  4710
 V2      4270  4490  4530  4710
 VI      0100  1750  1890  1950  3610  3810  3850  3890  3910  3950
         3970  4010  4030  4170  4210  4310  4330  4430  4450
 W1      1390  1430  3210  3250
 Z0      0470  5590
 Z1      0510  5590
 Z1$     0090  0950  4670  5630
 Z2      0550  2590  2630  2650  2910  2950  5590
 Z2$     0090  0990  4670  5630
 Z3      0590  1270  1290  1630  1770  2450  3550  3670  4850  5050
         5070  5590
 Z3$     0090  1030  4670  5630
 Z4      0630  1430  1450  1610  3250  3270  3470  5650
 Z4$     0090  1070  4670  5630
 Z5      0670  1750  3610  4690  5590
 Z5$     1110  4670  5630
 Z6      2910  3490  4690  5590
 Z7      2850  2870  2890  3610  4690  5610
 Z8      0750  0910  2842  3750  4690  5610
 Z9      0710  3710  5250  5610
```

SECTION 7

ISCN.04 - THE INSTRUMENT RUN COMMAND LEVEL ROUTER

The ISCN.04 program is the major RUN control program of the system. It contains a command line interpreter which executes operator-supplied commands. The ISCN.04 routes control to other programs for the performance of calibration, reporting, editing and plotting (if applicable). In addition, the program itself contains the code for the modification of RUN-modes. The most important function of the module is to access and reduce sample measurement data on one or more samples in a wheel pattern. The measurement function (M) may be invoked discretely from the Instrument RUN Command Line (IRCL) or a series of measurements may be performed automatically through a command string generator built into the program. This section will describe the function and flow of the ISCN.04 program. Figure 7 shows the modules and CHAINing relationships of the ISCN.04 program.

7.1 COMMAND STRING GENERATOR AND COMMAND LINE INTERPRETER

As the ISCN.04 program begins, important parameters are read from the transfer file (ISCN.TR). The most important of these is the sequencing mode M1. If M1 equals one then an automatic sequence is in progress. The wheel position (W) and the replicate counts (R) are then used to determine what the next command in the sequence should be. The command string generator can either generate a measurement command ('M(POS)') a calibrate command ('C') or a report command ('R'). The resulting command will then be treated as if it were input by an analyst and the interpreter will decipher and execute the command.

One aspect of the command string generator will be mentioned here. The escape-counter variable (E5) may have been incremented if the analyst pressed the ESCape key during the execution of an IRCL task. The E5 variable will be read before a command string is generated and if it is greater than zero, the program will change the sequence mode to semi-automatic (M1=0) and invoke the IRCL.

The command string interpreter handles single character entries and in some cases, it will handle cascaded commands. The analyst will be "helped" through a command definition process if a partial command string is input. The control routing to various auxiliary programs is usually straight forward, however, in the cases of plot module access, 'CHAIN THEN GOTO' statements are required since both the ISCN.08 and the ISCN.09 programs are accessible from other system programs.

7.2 RUN MODE MODIFICATION

The user-defined RUN-mode modification command 'U#' is serviced in the ISCN.04 programs. If ISCN.04 program size ever becomes a problem, this module may be made into a separate program. (The task of changing a RUN-mode in the current program is faster because CHAINing is avoided.) The software to decipher cascaded commands is rudimentary. The majority of the code protects against input errors. Besides just servicing the normal typing errors, the module also protects against an incorrect computational mode selection when the number of standards in the wheel pattern is insufficient to support a given mode.

The date acquisition mode (M2) is restricted in the code. If the mode is initialized to support only manually entered absorbance data (M2=0), then no change will be allowed to the automatic data acquisition mode (M2=1). This is governed by the injection counter (Z9) which keeps track of the number of automatic measurements performed during a RUN from either the ISCN.03 or the ISCN.04 programs.

No user confidence code has been included in the RUN-mode modification module to signify the change of mode except in the case of the data acquisition mode. It is a assumed that if no error message occurs, then the mode change was performed successfully.

7.3 THE MEASUREMENT FUNCTION AND RELATED OUTPUT

In Section 6 the data acquisition/reduction module used in the ISCN.03 program is described according to its adaptation to various instruments. The ISCN.04 program uses the same data acquisition/reduction module as in its corresponding adaptation of the ISCN.03 program. List file versions of the various adaptations of ISCN.04 are stored according to the naming convention explained in the beginning of Section 6.

It should be noted that the Perkin-Elmer 5000 produces slightly different output for an auto zero (AZ) baseline measurement, depending on the type of application. In the *furnace* application, an AZ measurement yields a special AZ answer (which is ignored by the data acquisition/reduction module) as well as a regular zero-level absorbance. In the *flame* application, the instrument outputs *only* the AZ answer. Therefore, the user must allocate an instrument blank position in the Run File for an AZ measurement whenever the furnace application is used.

The measurement function is triggered with the 'M' command specifying a wheel position of a sample to be measured. The wheel position is used to access data in the sample data file (ISCN.DF). This data, in turn, is used to generate a sample descriptor string segment specifying sample type, and any QC relationship the sample may have with a previous sample in the wheel. The sample descriptor super-string (S0$) is subdivided into ten string segments which verbally describe each of the ten potential sample types. The sample type is specified in the D1(3) array position in the data file. The fields for "TIMING SET STD" and "SURROGATE SPK" are never used in this application but have been included in lieu of the SFC standardization of sample types. If the sample being measured is a secondary member of a QC sample set, the pointer located in D1(2) will be used to access data on the primary member. This data will be maintained in the D2 array. Remember that the current sample is fully represented in the D1 array while the preceding and primary QC member will be represented in the D2 array.

Once the sample descriptor is generated to the terminal, the data acquisition module acquires an absorbance reading for the sample in question. This value will be immediately displayed to the user terminal. If standards have already been measured and calibrated, and the current sample is not a standard, a check is made to determine the acceptability of the absorbance relative to the standard absorbance scale. Values higher than the absorbance recorded for the highest calibration standard or lower than that obtained for the lowest non-zero calibration standard will cause an off-scale message to be generated to the user-terminal.

The replicate absorbance measurement is then included in the D1 array and the average absorbance field (D1(6)) and the replicate counter field (D1(7)) are updated. If standards have been calibrated and the current sample is not a standard, check standard, nor instrument blank, then a concentration is calculated through the appropriate subroutine. The replicate absorbance data is then displayed no matter what type of sample is being measured.

The dilution factor (D) is then computed and the reported concentration of the sample is determined by the current computational mode. If the sample is either a secondary member of a QC sample set or a stand-alone QC sample, a QC assessment is made on the sample. Note that the QC judgement is based on the stored limits and the current replicate measurement of the sample in question. If a reference is made back to a primary member of a QC sample set, the average absorbance for that sample is used in the comparison calculations.

7.4 CONCENTRATION COMPUTATION SUBROUTINE

The concentration computation subroutine contained in the ISCN.04 program provides a concentration (C1) if it is passed an absorbance value (S). It can either use one of the four standard equations or interpolation to compute a sample concentration. If only a limited number of standards were used to generate the equations, higher order equations may be unavailable. The P(5) array position contains a flag indicating whether a chosen equation is available (P(5)=0) or not available (P(5)=-1). If an equation is not available, the routine will step to the next lowest ordered equation and check to see if it is available. In addition, a special check is made during interpolation in order to field those cases where the signal is outside the range specified by the standard absorbances. In this case, the computational mode defaults to the forced zero linear equation. As long as one standard is measured and calibration is performed, this subroutine will produce a concentration for each corresponding absorbance.

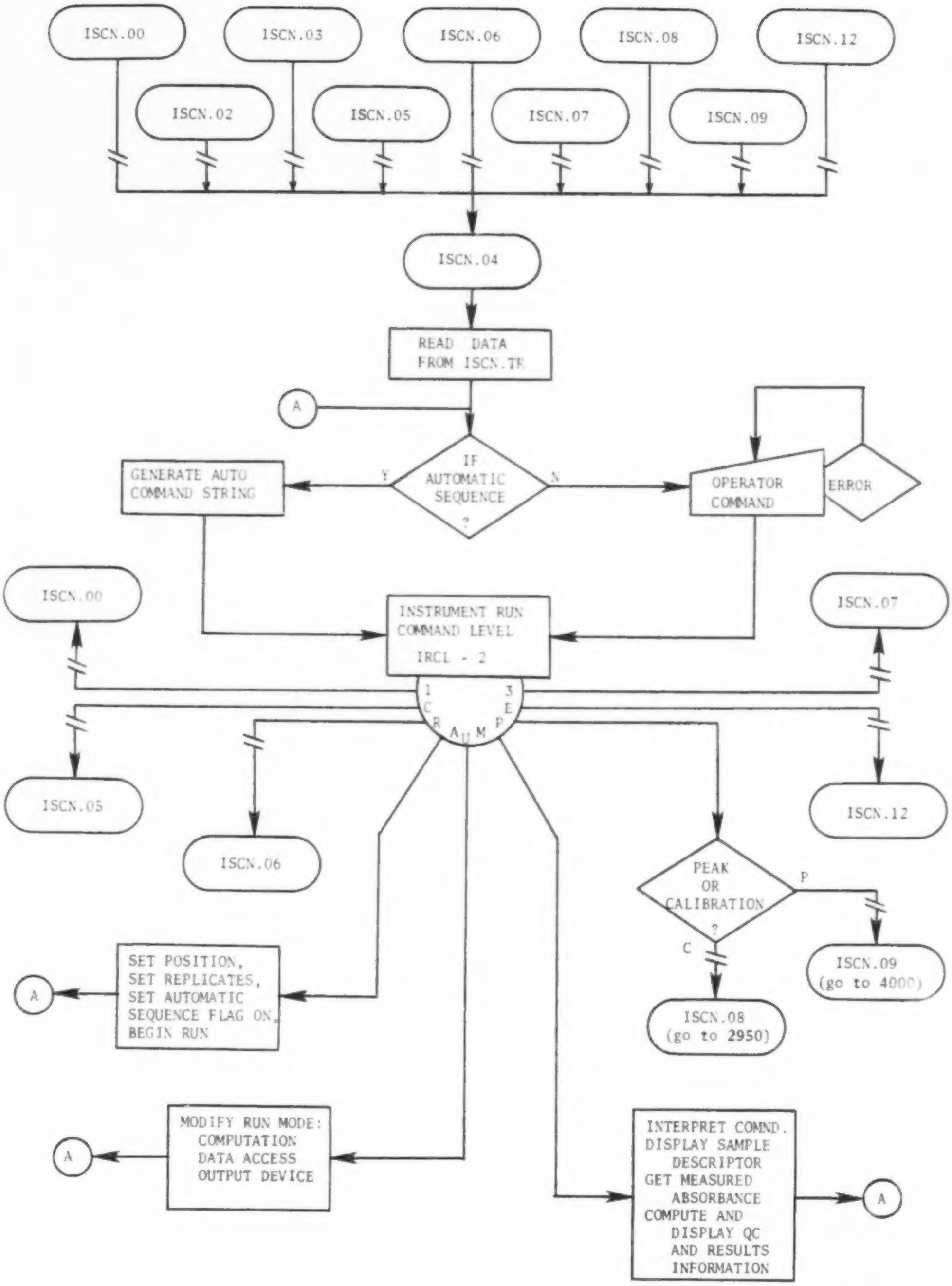
ISCN.00
ISCN.03
ISCN.06
ISCN.08
ISCN.12
ISCN.02
ISCN.05
ISCN.07
ISCN.09
ISCN.04
READ DATA FROM ISCN.TF
A
IF AUTOMATIC SEQUENCE ?
Y
N
GENERATE AUTO COMMAND STRING
OPERATOR COMMAND
ERROR
ISCN.00
INSTRUMENT RUN COMMAND LEVEL
IRCL - 2
ISCN.07
1
C
R
A
U
M
P
E
3
ISCN.05
ISCN.06
ISCN.12
PEAK OR CALIBRATION ?
P
C
SET POSITION, SET REPLICATES, SET AUTOMATIC SEQUENCE FLAG ON, BEGIN RUN
A
ISCN.09 (go to 4000)
ISCN.08 (go to 2950)
MODIFY RUN MODE: COMPUTATION DATA ACCESS OUTPUT DEVICE
A
INTERPRET COMND. DISPLAY SAMPLE DESCRIPTOR GET MEASURED ABSORBANCE COMPUTE AND DISPLAY QC AND RESULTS INFORMATION
A

Figure 9. Program ISCN.04 -- Instrument Run Command Level router.

TABLE 8. SYMBOL DEFINITIONS FOR ISCN.04 FOR PERKIN-ELMER 5000 FLAME/FURNACE AND VARIAN AA-775 FURNACE ADAPTATIONS

A	the result returned from the CALL 40
A$	a general purpose answer string
B$	the composite string acquired from the ACB
B0	the number of instrument blanks in a wheel pattern
B0$*	the two terminating charactes in B$
B9	the absorbance of the last measured instrument blank
C	the digital bay location
C$	the current IRCL command string
C0	the command string router variable
C0$	the master IRCL option string
C1	the computed concentration of a sample
C7	an interpolation variable - low concentration
C8	an interpolation variable - high concentration
D	the dilution factor for a sample
D0	the degree of a regression equation
D0$	the date code of the Run File
D1(	the data array for the current sample
D2(	the data array for a previous (primary) QC member
E5	the ESCape counter
F4$	the name of the peak plot file
F7$	the name of the Run File
G1	the calculated (average) concentration
G2	the current concentration (C1)
G3	the calculated concentration of the primary QC member (LD1, LSO, LDX)
G4	the reported concentration
G5	the reported spike value (LSA)
I	a general purpose counter
I1$	the identifier string for the current sample
I2	a peak array variable
I2$	the identifier string for a previous (primary) QC member
J	a counter
J0	a computational mode flag
K0	the calibration flag
L	the decimal-to-ASCII character locator
M	the mass of the spike
M0	the computational mode flag
M0$	the computational mode super-string
M1	the sequencing mode flag
M2	the data acquisition mode flag
M2$	the data acquisition mode super-string
M5	the output mode flag
N	an interpolation variable - the number of standards
N0	a peak array variable
N1	a peak array variable
N2	a peak array variable
N5	the number of standards calibrated
P$	the program and file prefix

TABLE 8 (Contd.)

P0$	the name of the program last executed
P1$	the name of the current program (.04)
P2$	the dummy name of the next executable program
P5$	the name of the calibration program
P6$	the name of the interim report generator program
P6**	a string position variable
P7$	the name of the Final Report generator program
P7	the position of an extraneous decimal point
P8	the posiition of the first decimal point in the string
P9	a peak array variable
P(	the coefficient array for regression equations
Q	the QC assessment variable
R	the replicate counter
R0	the number of reagent blanks in a wheel pattern
R0$	the generic PARMETH code in a Run File
R1	the number of replicates measurements made on a sample
R1$	the analyst's initial string
R2$	the analyte string
R3$	the concentration unit string
R4$	the instrument name string
R7	an interpolation variable - low absorbance
R8	an interpolation variable - high absorbance
R9	the difference between duplicates
S	the absorbance of a sample
S$	the ASCII character super string
S0	the number of calibration standards in a wheel pattern
S0$	the sample descriptor super-string
S9	the position at which calibration is to occur
T0	the number of timing set standards in a wheel pattern
U0	the number of unknowns in a wheel pattern
U1$	the format string for absorbance values
U2$	the format string for concentration values
V1	the measured absorbance for a sample
V(	a peak array variablele
W	the wheel position counter
W0	the number of samples in a wheel pattern
W1	the current wheel position
W2	the wheel position of a previous (primary) QC member
X	a QC assessment variable
X0	the lowest absorbance for calibration standards
X9	the highest absorbance for calibration standards
Z4$	the sample type descriptor
Z5$	the sample identifier
Z7	a peak array variable
Z8	a peak array variable
Z9	the measurement counter

---

* Variable in PE-5000 flame/furnace adaptation only

** Variable in Varian AA-775 furnace adaptation only

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                       PAGE  1
           PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0001 REM #=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#
0002 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0003 REM *   PROGRAM: ISCN.04 - RUN CONTROL PROGRAM; INCLUDES IRCL   *
0004 REM *            MEAS,MODE CHNG; CHAINS 00,05,06,07,08,09,&12   *
0005 REM *            FOR PE5000,MERL,RM465,FLAMELESS,T.REED,GSC1    *
0006 REM *   BY D.RYAN (UCCC), MAY 29, 1979                          *
0007 REM *   MOST RECENT REVISION: APRIL 14, 1980                    *
0008 REM #=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#
0009 ON ESC THEN GOSUB 8500
0010 ESC
0012 DIM R1$[4],R2$[2],R3$[8],R4$[16]
0020 DIM S0$[150],M0$[20],I1$[15],I2$[15],S1$[80]
0022 DIM D1[25],D2[25],P[6],V[300]
0024 DIM D0$[20],Z4$[20],Z5$[20],M2$[20]
0028 LET M0$="FZERLINRQUADCUBCINTR"
0030 LET C0$="HMCRE3AUP1"
0040 LET S0$="TIMING SET STD  INSTR CAL STD UNKNOWN SAMPLE    SPIKE  0
*    F    "
0050 LET S0$=S0$,"   CHECK  OF    DUPLICATE  OF  LAB CNTRL STD "
0060 LET S0$=S0$," REAGENT BLANK  SURROGATE SPK   INSTR BLANK  "
0066 LET I2=1
0068 LET R1=0
0070 LET W=0
0075 LET R=0
0080 LET M0=1
0082 LET M1=0
0084 LET M2=0
0086 LET K0=0
0088 LET B9=0
0090 LET S9=0
0092 LET W0=0
0100 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0101 LET P0$=P1$
0102 LET P1$=P$,".04"
0103 LET P2$=P$,".XX"
0104 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0105 LET F4$=P$,".PK"
0106 LET P5$=P$,".05"
0107 LET P6$=P$,".06"
0108 LET P7$=P$,".07"
0110 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0120 READ FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                       PAGE  2
           PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0130 READ FILE[2,9],R1$,R2$,R3$,R4$
0140 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
1000 READ FILE[2,15],M0,M1,R1,M2,M5,E5
1001 ON ESC THEN GOSUB 8500
1002 IF E5=0 THEN GOTO 1009
1003 LET M1=0
1004 LET E5=0
1006 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1009 IF M1=0 THEN GOTO 2000
1010 IF W>W0+1 THEN GOTO 1070
1012 IF R+1<=R1 THEN GOTO 1110
1015 LET R=0
1020 LET W=W+1
1030 IF W<>S9 THEN GOTO 1060
1040 LET C$="C"
1050 GOTO 1130
1060 IF W<=W0 THEN GOTO 1110
1070 LET C$="R"
1080 LET M1=0
1090 LET W=0
1095 LET R1=1
1100 GOTO 1130
1110 LET R=R+1
1120 LET C$="M",STR$(W)
1130 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1140 GOTO 2012
2000 PRINT
2001 PRINT "INSTRUMENT RUN OPTIONS: ([H]MCRE3AUP1) ";
2002 ON ERR THEN GOTO 2190
2003 NOESC
2004 INPUT " > ",C$;
2005 ESC
2006 ON ERR THEN STOP
2007 PRINT
2008 REM################################
2009 IF C$<>"DPR" THEN GOTO 2012
2010 STOP
2011 REM################################
2012 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
2014 IF LEN(C$)>0 THEN GOTO 2110
2020 PRINT "   M[POS]  MEASURE SAMPLE IN POS"
2050 PRINT "   C       CALIBRATE STANDARDS"

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         0         0         0         0         0         0         0
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    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE  3
              PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2060 PRINT "   R        REPORT STATUS"
2070 PRINT "   E$[POS] EDIT ABS OR DILUTION DATA (S[POS],P,D[POS])"
2080 PRINT "   3        ACCESS FINISH COMMAND LEVEL(3)"
2084 PRINT "   A        START AUTOMATIC RUN-SEQUENCE (WITH POS/REPS)"
2086 PRINT "   U$       USER EDIT OF RUN-MODES (K,D,O)"
2088 PRINT "   P$       PLOT CALIBRATION OR PEAK DATA (C OR P)"
2090 PRINT "   1        EXIT IRCL(2) TO ASCL(1)"
2092 GOTO 1000
2110 LET CO=POS(CO$,C$[1,1],1)
2116 ON CO THEN GOTO 2020, 2120, 2500, 2504, 2380, 2508, 2840, 2600, 2
*    512, 2560
2117 GOTO 2190
2120 IF LEN(C$)<=1 THEN GOTO 2190
2125 FOR I=1 TO LEN(C$[2])
2130   IF C$[I+1,I+1]<"0" THEN IF C$[I+1,I+1]>"9" THEN GOTO 2190
2140 NEXT I
2150 LET W1=VAL(C$[2])
2160 IF STR$(W1)<>C$[2] THEN GOTO 2190
2170 IF INT(W1)=W1 THEN IF W1>=1 THEN IF W1<=W0 THEN GOTO 2220
2190 ON ERR THEN STOP
2192 ON ESC THEN GOTO 8500
2195 PRINT
2200 PRINT "<7>OPTION ERROR<7>"
2210 GOTO 1000
2220 PRINT
2225 GOSUB 7000
2260 PRINT USING "MEAS POS ### ",W1;
2270 PRINT "/";I1$;"/";SO$[D1[3]*15+1,(D1[3]+1)*15];
2280 LET W2=D1[2]
2290 IF W2<W1 THEN IF W2>=1 THEN GOTO 2300
2291 IF W2<>0 THEN GOTO 2295
2292 PRINT
2293 GOTO 2360
2295 IF W2=-1 THEN GOTO 2350
2298 GOTO 2360
2300 GOSUB 7100
2310 PRINT SO$[D2[3]*15+1,(D2[3]+1)*15];
2320 PRINT USING " IN POS ###",W2
2330 GOTO 2360
2350 PRINT " (HAS QC)"
2360 GOTO 3000
2380 LET P2$=P$,".12"

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         0         0         0         0         0         0         0
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6/4/1981                                                      PAGE  4
              PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2382 GOTO 2554
2500 LET P2$=P5$
2502 GOTO 2554
2504 LET P2$=P6$
2506 GOTO 2554
2508 LET P2$=P7$
2510 GOTO 2554
2512 LET A$=""
2514 IF LEN(C$)>1 THEN LET A$=C$[2,2]
2516 IF LEN(A$)>0 THEN GOTO 2534
2518 PRINT
2520 PRINT "CALIBRATION OR PEAK PLOTTING ([C] OR P) ";
2530 GOSUB 5100
2534 ON POS("CP",A$,1) THEN GOTO 2542, 2548
2538 PRINT "<7>";
2540 GOTO 2518
2542 LET P2$=P$,".08"
2544 ON ERR THEN GOTO 2190
2545 NOESC
2546 CHAIN P2$ THEN GOTO 2950
2548 LET P2$=P$,".09"
2550 ON ERR THEN GOTO 2190
2551 NOESC
2552 CHAIN P2$ THEN GOTO 4000
2554 ON ERR THEN GOTO 2190
2556 NOESC
2558 CHAIN P2$
2560 LET P2$=P$,".00"
2562 CLOSE
2564 GOTO 2554
2600 GOTO 2608
2602 PRINT "   K - CHANGE COMPUTATION'L MODE (ZLQCI)"
2604 PRINT "   D - CHANGE DATA ACQUISITION MODE"
2606 PRINT "   O - CHANGE OUTPUT MODE (TLBN)"
2608 LET A$=""
2610 IF LEN(C$)>1 THEN LET A$=C$[2]
2612 IF LEN(A$)>0 THEN GOTO 2632
2614 PRINT
2618 PRINT "MODE EDIT OPTIONS: ([H]KDO) ";
2620 GOSUB 5100
2632 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2638
2634 GOTO 2602

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         0         0         0         0         0         0         0
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6/4/1981                                                      PAGE  5
               PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2638 ON POS("KDO",A$[1,1],1) THEN GOTO 2660, 2908, 2928
2644 PRINT "<7>";
2646 GOTO 2614
2660 GOTO 2672
2662 PRINT "    Z - FORCED ZERO LINEAR"
2664 PRINT "    L - REGULAR LINEAR"
2666 PRINT "    Q - QUADRATIC"
2568 PRINT "    C - CUBIC"
2670 PRINT "    I - INTERPOLATION"
2672 IF LEN(A$)=1 THEN LET A$=""
2673 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2674 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2675 IF LEN(A$)>0 THEN GOTO 2692
2676 PRINT
2678 PRINT "COMPUTATIONAL MODE: ([H]ZLQCI) ";
2680 GOSUB 5100
2692 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2696
2694 GOTO 2662
2696 LET M0=POS("ZLQCI",A$,1)
2698 IF M0>0 THEN GOTO 2704
2700 PRINT "<7>";
2702 GOTO 2676
2704 LET M0=M0-1
2706 IF K0=0 THEN GOTO 2904
2710 IF M0=4 THEN GOTO 2750
2720 IF M0<S0 THEN GOTO 2904
2730 PRINT "<7>ILLEGAL MODE!<7>";
2740 GOTO 2700
2750 IF S0<2 THEN GOTO 2730
2760 GOTO 2904
2840 LET M1=1
2842 LET R=0
2844 PRINT "<13>NUMBER OF REPLICATES ";
2846 ON ERR THEN GOTO 5000
2848 ON ESC THEN GOTO 1000
2850 INPUT "> ",R1;
2852 ON ESC THEN GOSUB 8500
2854 ON ERR THEN STOP
2856 PRINT
2858 IF R1>0 THEN IF R1<7 THEN IF INT(R1)=R1 THEN GOTO 2864
2860 PRINT "<7>";
2862 GOTO 2840

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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      STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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               PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2864 PRINT "<13>STARTING POSITION ";
2866 ON ERR THEN GOTO 5000
2868 ON ESC THEN GOTO 1000
2870 INPUT "> ",W;
2872 ON ESC THEN GOSUB 8500
2874 ON ERR THEN STOP
2876 PRINT
2878 IF W>=1 THEN IF W<=W0 THEN IF W=INT(W) THEN GOTO 2884
2880 PRINT "<7>";
2882 GOTO 2864
2884 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
2886 IF M2=0 THEN GOTO 2904
2888 PRINT "<13>SET WHEEL POSITION TO ";W
2890 PRINT "SET REPLICATE COUNTER TO ";R1
2892 PRINT "PRESS RETURN WHEN READY ";
2900 GOSUB 5100
2904 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2906 GOTO 1000
2908 LET M2$="KEYBOARDCOMPUTER"
2910 PRINT
2912 PRINT "CHANGE FROM ";M2$[M2*8+1,(M2+1)*8];
2914 ON M2+1 THEN GOTO 2920, 2916
2916 LET M2=0
2918 GOTO 2924
2920 LET M2=1
2922 IF Z9=0 THEN LET M2=0
2924 PRINT " TO ";M2$[M2*8+1,(M2+1)*8];" ACQUISITION."
2926 GOTO 2904
2928 GOTO 2944
2930 PRINT "    T - TERMINAL"
2934 PRINT "    L - LINEPRINTER"
2936 PRINT "    B - BOTH TERMINAL AND LINEPRINTER"
2938 PRINT "    N - NONE"
2944 IF LEN(A$)=1 THEN LET A$=""
2945 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2946 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2947 IF LEN(A$)>0 THEN GOTO 2964
2948 PRINT
2950 PRINT "OUTPUT OPTIONS: ([H]TLBN) ";
2960 GOSUB 5100
2964 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2968
2966 GOTO 2930

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         0         0         0         0         0         0         0
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EPA-287 (Cin.)
(4-76)

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    STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                        PAGE  7
              PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2968 LET M5=POS("TLBN",A$,1)
2970 IF M5>0 THEN GOTO 2976
2972 PRINT "<7>";
2974 GOTO 2948
2976 LET M5=M5-1
2978 GOTO 2904
2980 LET M1=0
2982 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2984 GOTO 1000
3000 IF M2=0 THEN GOTO 3990
3002 LET V1=-9999
3100 READ FILE[2,16],Z0,Z1,Z2,Z3,Z5,Z6
3110 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
3120 READ FILE[2,18],Z1$,Z2$,Z3$,Z4$,Z5$
3130 LET Z5$=I1$
3140 LET Z4$=S0$[D1[3]*15+1,(D1[3]+1)*15]
3142 REM ########### PE 5000 ROUTINE ######################
3150 IF Z9>0 THEN GOTO 3170
3152 LET C=25911
3154 LET D=0
3156 CALL 257,C,D
3170 DIM B$[50],S$[95]
3180 LET S$=" !<34>#$%&'()*+,-./0123456789:;<=>?@"
3190 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_@"
3200 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^"
3210 LET A=0
3220 LET V1=-9999
3230 LET B$=""
3240 ON ESC THEN GOTO 2980
3242 CALL 40,A
3244 ON ESC THEN GOSUB 8500
3246 PRINT USING "### ",A;
3250 IF A=10 THEN GOTO 3320
3260 IF A>=32 THEN IF A<=126 THEN GOTO 3290
3280 GOTO 3240
3290 LET L=A-31
3300 LET B$=B$,S$[L,L]
3310 GOTO 3240
3320 PRINT
3322 PRINT B$
3324 LET B0$=B$[LEN(B$)-1,LEN(B$)]
3325 IF POS("AVSDAZ",B0$,1)>0 THEN GOTO 3230

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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    STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                        PAGE  8
              PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3326 IF POS("S1S2S3RSCVERC ",B0$,1)>0 THEN GOTO 3400
3329 ON ERR THEN GOTO 3400
3340 LET P8=POS(B$,".",1)
3350 IF P8=0 THEN GOTO 3400
3352 LET P7=POS(B$,".",P8+1)
3354 IF P7<>0 THEN GOTO 3400
3360 LET V1=VAL(B$[P8-2,P8+3])
3370 LET Z9=Z9+1
3380 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
3382 ON ERR THEN STOP
3390 GOTO 3980
3400 ON ERR THEN STOP
3410 FOR I=1 TO 7
3420   PRINT "<7>";
3430   DELAY =.3
3440 NEXT I
3450 GOTO 3380
3460 REM ##################################################
3980 PRINT "  MEASURED ABS = ";V1;
3982 IF V1<>-9999 THEN GOTO 4001
3984 PRINT "<7>   DATA ERROR!<7>";
3986 IF M2=1 THEN PRINT "<7>SEQUENCING IS BEING TERMINATED!<7>";
3988 PRINT
3989 GOTO 2980
3990 PRINT "  MEASURED ABS ";
3992 ON ERR THEN GOTO 5000
3993 ON ESC THEN GOTO 2980
3994 INPUT "> ",V1;
3995 ON ESC THEN GOSUB 8500
3996 ON ERR THEN STOP
4000 GOTO 3982
4001 IF K0<>1 THEN GOTO 4020
4002 IF D1[3]=1 THEN GOTO 4020
4003 IF D1[3]<>7 THEN IF D1[3]<>9 THEN IF V1<X0 THEN GOTO 4006
4004 GOTO 4010
4006 PRINT  TAB(20);"<7>OFF SCALE LOW!"
4008 GOTO 4030
4010 IF V1<=X9 THEN GOTO 4020
4012 PRINT  TAB(20);"<7>OFF SCALE HIGH!"
4014 GOTO 4030
4020 PRINT
4030 IF D1[3]<>9 THEN GOTO 4032

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE  9
          PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4031 LET B9=V1
4032 IF D1[7]+1<=6 THEN GOTO 4060
4035 PRINT
4040 PRINT "  <7>TOO MANY REPLICATES!<7>"
4050 GOTO 4100
4060 LET D1[7]=D1[7]+1
4062 LET D1[D1[7]+7]=V1
4064 LET D1[6]=0
4066 FOR J=1 TO D1[7]
4068   LET D1[6]=D1[6]+D1[J+7]
4070 NEXT J
4072 LET D1[6]=D1[6]/D1[7]
4080 GOSUB 7200
4100 FOR I=0 TO 3
4110   IF INT(I*I+5E-02)=D1[3] THEN GOTO 4200
4115 NEXT I
4120 IF K0=1 THEN GOTO 4150
4140 GOTO 4200
4150 IF D1[7]=0 THEN GOTO 4200
4152 LET S=V1
4154 GOSUB 8000
4156 LET G1=C1
4170 PRINT "  CALC CONC    = ";G1;
4200 PRINT "  AVE.ABS= ";D1[6];
4220 PRINT "  NO.REPS = ";D1[7]
4230 IF D1[7]=0 THEN GOTO 1000
4235 PRINT  TAB(1);
4240 FOR I=1 TO D1[7]
4250   PRINT I;")";D1[I+7];"  ";
4260 NEXT I
4270 PRINT
4280 LET D=1
4290 ON D1[3] THEN GOTO 1000, 4320, 4310, 4800, 4340, 4350, 4350
4300 GOTO 1000
4310 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
4315 GOTO 4350
4320 LET D=(D1[4]+D1[5])/D1[4]
4330 GOTO 4350
4340 LET D=(D2[4]+D2[5])/D2[4]
4350 IF K0=1 THEN GOTO 4390
4380 GOTO 1000
4390 LET S=D1[6]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE 10
          PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4400 GOSUB 8000
4410 LET G2=C1
4440 PRINT "  CURRENT CONC     = ";G2;"(";M0$[(J0-1)*4+1,J0*4];")"
4445 IF D=1 THEN GOTO 4460
4450 PRINT "  DIL FACTOR       = ";D
4460 LET G3=G2*D
4480 PRINT "    RPT CONC (";I1$[12,14];")   = ";G3
4490 ON D1[3] THEN GOTO 1000, 1000, 4530, 4800, 4620, 4710, 4760
4495 GOTO 1000
4530 IF D2[7]=0 THEN GOTO 1000
4540 LET S=D2[6]
4550 GOSUB 8000
4560 LET G4=C1*(D2[4]+D2[5])/D2[4]
4562 LET M=D1[4]*D1[5]
4564 IF D1[4]=0 THEN LET M=D1[5]
4566 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
4570 PRINT "    RPT CONC (";I2$[12,14];")   = ";G4
4580 PRINT "    RPT SPIKE (LSA)  = ";G5
4582 IF G5=0 THEN GOTO 4619
4584 LET Q=(G3-G4)*100/G5
4586 PRINT "    % RECOVERY       = ";Q;"%"
4587 PRINT "    QC MESSAGE       > ";
4588 FOR J=1 TO 5
4590   IF D1[3]<>3 THEN GOTO 4594
4592   IF Q>D2[13+J] THEN GOTO 4600
4593   GOTO 4596
4594   IF Q>D1[13+J] THEN GOTO 4600
4596 NEXT J
4598 LET J=6
4600 ON J THEN GOTO 4602, 4606, 4610, 4610, 4614, 4618
4602 PRINT "<7><7><7>OUT HIGH!<7><7><7>"
4604 GOTO 4619
4606 PRINT "<7><7>WARN HIGH!<7><7>"
4608 GOTO 4619
4610 PRINT "QC OK"
4612 GOTO 4619
4614 PRINT "<7><7>WARN LOW!<7><7>"
4616 GOTO 4619
4618 PRINT "<7><7><7>OUT LOW!<7><7><7>"
4619 GOTO 1000
4620 IF D2[7]=0 THEN GOTO 1000
4630 LET S=D2[6]

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         0         0         0         0         0         0         0
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE 11
           PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4640 GOSUB 8000
4650 LET G4=C1+D
4660 PRINT "    RPT CONC (";I2$[12,14];")    = ";G4
4665 LET X=(G3+G4)/2
4670 PRINT "    XBAR (AVE)        = ";X
4675 LET R9=ABS(G3-G4)
4680 PRINT "    R (CRIT DIFF)     = ";R9
4682 PRINT "    QC MESSAGE        > ";
4684 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 4690
4686 PRINT "QC OK!"
4683 GOTO 4700
4690 PRINT "<7><7><7>OUT!<7><7><7>"
4700 GOTO 1000
4710 PRINT "    THEOR CONC (LCT) = ";D1[5]
4720 IF D1[5]=0 THEN GOTO 4750
4725 LET Q=100*G3/D1[5]
4730 PRINT "    % RECOVERY        = ";Q;"%"
4740 GOTO 4587
4750 GOTO 1000
4760 LET Q=G3
4770 GOTO 4587
4800 IF D2[7]=0 THEN GOTO 1000
4802 LET X=V1
4810 PRINT "    ABS OF CHK STD   = ";X
4820 PRINT "    ABS OF CAL STD   = ";D2[6]
4825 IF D2[6]=0 THEN GOTO 4850
4827 LET Q=100*X/D2[6]
4830 PRINT "    % RECOVERY        = ";Q;"%"
4840 GOTO 4587
4850 GOTO 1000
5000 PRINT "<7> ";
5010 RETRY
5100 ON ERR THEN GOTO 5000
5110 ON ESC THEN GOTO 1000
5120 INPUT "> ",A$;
5130 ON ESC THEN GOSUB 8500
5140 ON ERR THEN STOP
5150 PRINT
5160 RETURN
6980 REM [  READ/WRITE (.DF) SUBROUTINES   ]
6990 REM ####################################
7000 MAT READ FILE[1,W1],D1

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         0         0         0         0         0         0         0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE 12
           PROGRAM LISTING FOR M465G00004.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
7010 READ FILE[0,W1],I1$
7020 RETURN
7100 MAT READ FILE[1,W2],D2
7110 READ FILE[0,W2],I2$
7120 RETURN
7200 MAT WRITE FILE[1,W1],D1
7210 WRITE FILE[0,W1],I1$
7220 RETURN
7300 MAT WRITE FILE[1,W2],D2
7310 WRITE FILE[0,W2],I2$
7320 RETURN
8000 LET J0=M0+1
8005 IF J0=5 THEN GOTO 8090
8010 READ FILE[2,4+J0],N,D0,P[1],P[2],P[3],P[4],P[5],P[6]
8020 IF P[5]=0 THEN GOTO 8070
8030 LET J0=J0-1
8040 IF J0>=1 THEN GOTO 8010
8050 LET C1=0
8060 RETURN
8070 LET C1=P[1]+S*(P[2]+S*(P[3]+S*P[4]))
8080 GOTO 8060
8090 READ FILE[2,5],N
8092 IF N<=1 THEN GOTO 8140
8095 FOR I=1 TO N-1
8100   READ FILE[2,19+I],R7,C7
8110   READ FILE[2,20+I],R8,C8
8120   IF S>=R7 THEN IF S<R8 THEN GOTO 8400
8130 NEXT I
8140 LET J0=1
8150 GOTO 8010
8400 LET C1=C7+((S-R7)*(C8-C7))/(R8-R7)
8410 RETURN
8500 NOESC
8510 READ FILE[2,15],M0,M1,R1,M2,M5,E5
8520 LET E5=E5+1
8525 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
8540 ESC
8550 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                    SYMBOL TABLE FOR M465G00004.AS

SYMBOL    REFERENCES
------    ----------------------------------------------------------
  1000    2092  2210  2848  2868  2906  2984  4230  4290  4300  4380
          4490  4495  4530  4619  4620  4700  4750  4800  4850  5110
  1009    1002
  1060    1030
  1070    1010
  1110    1012  1060
  1130    1050  1100
  2000    1009
  2012    1140  2009
  2020    2116
  2110    2014
  2120    2116
  2190    2002  2117  2120  2130  2160  2544  2550  2554
  2220    2170
  2295    2291
  2300    2290
  2350    2295
  2360    2293  2298  2330
  2380    2116
  2500    2116
  2504    2116
  2508    2116
  2512    2116
  2518    2540
  2534    2516
  2542    2534
  2548    2534
  2554    2382  2502  2506  2510  2564
  2560    2116
  2600    2116
  2602    2634
  2608    2600
  2614    2646
  2632    2612
  2638    2632
  2660    2638
  2662    2694
  2672    2660
  2676    2702
  2692    2675
  2696    2692
  2700    2740
  2704    2698
  2730    2750
  2750    2710
```

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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                    SYMBOL TABLE FOR M465G00004.AS

SYMBOL    REFERENCES
------    ----------------------------------------------------------
  2840    2116  2862
  2864    2858  2882
  2884    2878
  2904    2706  2720  2760  2886  2926  2978
  2908    2638
  2916    2914
  2920    2914
  2924    2918
  2928    2638
  2930    2966
  2944    2928
  2948    2974
  2950    2546
  2964    2947
  2968    2964
  2976    2970
  2980    3240  3989  3993
  3000    2360
  3170    3150
  3230    3325
  3240    3280  3310
  3290    3260
  3320    3250
  3380    3450
  3400    3326  3329  3350  3354
  3980    3390
  3982    4000
  3990    3000
  4000    2552
  4001    3982
  4006    4003
  4010    4004
  4020    4001  4002  4010
  4030    4008  4014
  4032    4030
  4060    4032
  4100    4050
  4150    4120
  4200    4110  4140  4150
  4310    4290
  4320    4290
  4340    4290
  4350    4290  4315  4330
  4390    4350
  4460    4445
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                   SYMBOL TABLE FOR M465G00004.AS

SYMBOL    REFERENCES
______    _____________________________________________________________

 4530     4490
 4587     4740  4770  4840
 4594     4590
 4596     4593
 4600     4592  4594
 4602     4600
 4606     4600
 4610     4600
 4614     4600
 4618     4600
 4619     4582  4604  4608  4612  4616
 4620     4490
 4690     4684
 4700     4688
 4710     4490
 4750     4720
 4760     4490
 4800     4290  4490
 4850     4825
 5000     2846  2866  3992  5100
 5100     2530  2620  2680  2900  2960
 7000     2225
 7100     2300
 7200     4080
 8000     4154  4400  4550  4640
 8010     8040  8150
 8060     8080
 8070     8020
 8090     8005
 8140     8092
 8400     8120
 8500     0009  1001  2192  2852  2872  3244  3995  5130
 A        3210  3242  3246  3250  3260  3290
 A$       2512  2514  2516  2534  2608  2610  2612  2632  2638  2672
          2673  2674  2675  2692  2696  2944  2945  2946  2947  2964
          2968  5120
 B$       3170  3230  3300  3322  3324  3340  3352  3360
 B0       0110
 B0$      3324  3325  3326
 B9       0088  4031
 C        3152  3156
 C$       0120  1040  1070  1120  2004  2009  2012  2014  2110  2120
          2125  2130  2150  2160  2514  2610  2674  2884  2946
 C0       2110  2116
 C0$      0030  2110
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                   SYMBOL TABLE FOR M465G00004.AS

SYMBOL    REFERENCES
______    _____________________________________________________________

 C1       4156  4410  4560  4566  4650  8050  8070  8400
 C7       8100  8400
 C8       8110  8400
 D        3154  3156  4280  4310  4320  4340  4445  4450  4460  4650
 D0       8010
 D0$      0024  0100  0104
 D1       7000  7200
 D1[      0022  2270  2280  3140  4002  4003  4030  4032  4060  4062
          4064  4066  4068  4072  4110  4150  4200  4220  4230  4240
          4250  4290  4310  4320  4390  4490  4562  4564  4566  4590
          4594  4710  4720  4725
 D2       7100  7300
 D2[      0022  2310  4310  4340  4530  4540  4560  4566  4592  4620
          4630  4684  4800  4820  4825  4827
 E5       1000  1002  1004  1006  1130  2904  2982  8510  8520  8525
 F4$      0105
 F7$      0100  0104
 FL#0     7010  7110  7210  7310
 FL#1     7000  7100  7200  7300
 FL#2     0100  0104  0110  0120  0130  0140  1000  1006  1130  2012
          2884  2904  2982  3100  3110  3120  3380  8010  8090  8100
          8110  8510  8525
 G1       4156  4170
 G2       4410  4440  4460
 G3       4460  4480  4584  4665  4675  4725  4760
 G4       4560  4570  4584  4650  4660  4665  4675
 G5       4566  4580  4582  4584
 I        2125  2130  2140  3410  3440  4100  4110  4115  4240  4250
          4260  8095  8100  8110  8130
 I1$      0020  2270  3130  4480  7010  7210
 I2       0066
 I2$      0020  4570  4660  7110  7310
 J        4066  4068  4070  4588  4592  4594  4596  4598  4600
 J0       4440  8000  8005  8010  8030  8040  8140
 K0       0086  0120  2012  2706  2884  4001  4120  4350
 L        3290  3300
 M        4562  4564  4566
 M0       0080  1000  1006  1130  2696  2698  2704  2710  2720  2904
          2982  8000  8510  8525
 M0$      0020  0028  4440
 M1       0082  1000  1003  1006  1009  1080  1130  2840  2904  2980
          2982  8510  8525
 M2       0084  1000  1006  1130  2886  2904  2912  2914  2916  2920
          2922  2924  2982  3000  3986  8510  8525
 M2$      0024  2908  2912  2924
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                   SYMBOL TABLE FOR M465G00004.AS

SYMBOL    REFERENCES
------   ----------------------------------------------------------
M5       1000  1006  1130  2904  2968  2970  2976  2982  8510  8525
N        8010  8090  8092  8095
N0       0140  3110  3380
N1       0140  3110  3380
N2       0140  3110  3380
N5       0120  2012  2884
P$       0100  0102  0103  0104  0105  0106  0107  0108  2380  2542
         2548  2560
P0$      0100  0101  0104
P1$      0100  0101  0102  0104
P2$      0100  0103  0104  2380  2500  2504  2508  2542  2546  2548
         2552  2558  2560
P5$      0106  2500
P6$      0107  2504
P7       3352  3354
P7$      0108  2508
P8       3340  3350  3352  3360
P9       0140  3110  3380
P[       0022  8010  8020  8070
Q        4584  4586  4592  4594  4725  4730  4760  4827  4830
R        0075  0120  1012  1015  1110  2012  2842  2884
R0       0110
R0$      0100  0104
R1       0068  1000  1006  1012  1095  1130  2850  2858  2890  2904
         2982  8510  8525
R1$      0012  0130
R2$      0012  0130
R3$      0012  0130
R4$      0012  0130
R7       8100  8120  8400
R8       8110  8120  8400
R9       4675  4680  4684
S        4152  4390  4540  4630  8070  8120  8400
S$       3170  3180  3190  3200  3300
S0       0110  2720  2750
S0$      0020  0040  0050  0060  2270  2310  3140
S1$      0020
S9       0090  0110  1030
T0       0110
U0       0110
U1$      0120  2012  2884
U2$      0120  2012  2884
V1       3002  3220  3360  3980  3982  3994  4003  4010  4031  4062
         4152  4802
V[       0022
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE 18
                   SYMBOL TABLE FOR M465G00004.AS

SYMBOL    REFERENCES
------   ----------------------------------------------------------
W        0070  0120  1010  1020  1030  1060  1090  1120  2012  2870
         2878  2884  2888
W0       0092  0110  1010  1060  2170  2878
W1       2150  2160  2170  2260  2290  7000  7010  7200  7210
W2       2280  2290  2291  2295  2320  7100  7110  7300  7310
X        4665  4670  4684  4802  4810  4827
X0       0120  2012  2884  4003
X9       0120  2012  2884  4010
Y0       0110
Y9       0110
Z0       3100
Z1       3100
Z1$      3120
Z2       3100
Z2$      3120
Z3       3100
Z3$      3120
Z4$      0024  3120  3140
Z5       3100
Z5$      0024  3120  3130
Z6       3100
Z7       0140  3110  3380
Z8       0140  3110  3380
Z9       0140  2922  3110  3150  3370  3380
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EPA-287 (Cin.)
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE  1
                PROGRAM LISTING FOR E520G77504.AS

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
0001 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0002 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0003 REM *   PROGRAM: ISCN.04 - RUN CONTROL PROGRAM; INCLUDES IRCL    *
0004 REM *            MEAS, MODE CHNG; CHAINS 00,05,06,07,08,09&12    *
0005 REM *            FOR AA775,EMSL,RM520,FLAMELESS,R.LEOBKER,GSCO   *
0006 REM *   BY D.RYAN (UCCC), MAY 29, 1979                           *
0007 REM *   MOST RECENT REVISION: APRIL 14, 1980                     *
0008 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0009 ON ESC THEN GOSUB 8500
0010 ESC
0012 DIM R1$[4],R2$[2],R3$[8],R4$[16]
0020 DIM S0$[150],M0$[20],I1$[15],I2$[15],S1$[80]
0022 DIM D1[25],D2[25],P[6],V[300]
0024 DIM D0$[20],Z4$[20],Z5$[20],M2$[20]
0028 LET M0$="FZERLINRQUADCUBCINTR"
0030 LET C0$="HMCRE3AUP1"
0040 LET S0$="TIMING SET STD  INSTR CAL STD UNKNOWN SAMPLE    SPIKE  0
*    F   "
0050 LET S0$=S0$,"   CHECK  OF    DUPLICATE  OF  LAB CNTRL STD "
0060 LET S0$=S0$," REAGENT BLANK  SURROGATE SPK   INSTR BLANK   "
0066 LET I2=1
0068 LET R1=0
0070 LET W=0
0075 LET R=0
0080 LET M0=1
0082 LET M1=0
0084 LET M2=0
0086 LET K0=0
0088 LET B9=0
0090 LET S9=0
0092 LET W0=0
0100 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0101 LET P0$=P1$
0102 LET P1$=P$,".04"
0103 LET P2$=P$,".XX"
0104 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0105 LET F4$=P$,".PK"
0106 LET P5$=P$,".05"
0107 LET P6$=P$,".06"
0108 LET P7$=P$,".07"
0110 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0120 READ FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE  2
                PROGRAM LISTING FOR E520G77504.AS

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
0130 READ FILE[2,9],R1$,R2$,R3$,R4$
0140 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
1000 READ FILE[2,15],M0,M1,R1,M2,M5,E5
1001 ON ESC THEN GOSUB 8500
1002 IF E5=0 THEN GOTO 1009
1003 LET M1=0
1004 LET E5=0
1006 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1009 IF M1=0 THEN GOTO 2000
1010 IF W>W0+1 THEN GOTO 1070
1012 IF R+1<=R1 THEN GOTO 1110
1015 LET R=0
1020 LET W=W+1
1030 IF W<>S9 THEN GOTO 1060
1040 LET C$="C"
1050 GOTO 1130
1060 IF W<=W0 THEN GOTO 1110
1070 LET C$="R"
1080 LET M1=0
1090 LET W=0
1095 LET R1=1
1100 GOTO 1130
1110 LET R=R+1
1120 LET C$="M",STR$(W)
1130 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1140 GOTO 2012
2000 PRINT
2001 PRINT "INSTRUMENT RUN OPTIONS: ([H]MCRE3AUP1) ";
2002 ON ERR THEN GOTO 2190
2003 NOESC
2004 INPUT " > ",C$;
2005 ESC
2006 ON ERR THEN STOP
2007 PRINT
2008 REM##############################
2009 IF C$<>"DPR" THEN GOTO 2012
2010 STOP
2011 REM##############################
2012 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
2014 IF LEN(C$)>0 THEN GOTO 2110
2020 PRINT "   M[POS]  MEASURE SAMPLE IN POS"
2050 PRINT "   C       CALIBRATE STANDARDS"

12345678911234567892123456789312345678941234567895123456789612345678970
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   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                       PAGE  3
               PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2060 PRINT "   R        REPORT STATUS"
2070 PRINT "   E$[POS] EDIT ABS OR DILUTION DATA (S[POS],P,D[POS])"
2080 PRINT "   3        ACCESS FINISH COMMAND LEVEL(3)"
2084 PRINT "   A        START AUTOMATIC RUN-SEQUENCE (WITH POS/REPS)"
2086 PRINT "   U$       USER EDIT OF RUN-MODES (K,D,0)"
2088 PRINT "   P$       PLOT CALIBRATION OR PEAK DATA (C OR P)"
2090 PRINT "   1        EXIT IRCL(2) TO ASCL(1)"
2092 GOTO 1000
2110 LET C0=POS(C0$,C$[1,1],1)
2116 ON C0 THEN GOTO 2020, 2120, 2500, 2504, 2380, 2508, 2840, 2600, 2
*     512, 2560
2117 GOTO 2190
2120 IF LEN(C$)<=1 THEN GOTO 2190
2125 FOR I=1 TO LEN(C$[2])
2130   IF C$[I+1,I+1]<"0" THEN IF C$[I+1,I+1]>"9" THEN GOTO 2190
2140 NEXT I
2150 LET W1=VAL(C$[2])
2160 IF STR$(W1)<>C$[2] THEN GOTO 2190
2170 IF INT(W1)=W1 THEN IF W1>=1 THEN IF W1<=W0 THEN GOTO 2220
2190 ON ERR THEN STOP
2192 ON ESC THEN GOTO 8500
2195 PRINT
2200 PRINT "<7>OPTION ERROR<7>"
2210 GOTO 1000
2220 PRINT
2225 GOSUB 7000
2260 PRINT USING "MEAS POS ### ",W1;
2270 PRINT "/";I1$;"/";S0$[D1[3]*15+1,(D1[3]+1)*15];
2280 LET W2=D1[2]
2290 IF W2<W1 THEN IF W2>=1 THEN GOTO 2300
2291 IF W2<>0 THEN GOTO 2295
2292 PRINT
2293 GOTO 2360
2295 IF W2=-1 THEN GOTO 2350
2298 GOTO 2360
2300 GOSUB 7100
2310 PRINT S0$[D2[3]*15+1,(D2[3]+1)*15];
2320 PRINT USING " IN POS ###",W2
2330 GOTO 2360
2350 PRINT " (HAS QC)"
2360 GOTO 3000
2380 LET P2$=P$,".12"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                       PAGE  4
               PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2382 GOTO 2554
2500 LET P2$=P5$
2502 GOTO 2554
2504 LET P2$=P6$
2506 GOTO 2554
2508 LET P2$=P7$
2510 GOTO 2554
2512 LET A$=""
2514 IF LEN(C$)>1 THEN LET A$=C$[2,2]
2516 IF LEN(A$)>0 THEN GOTO 2534
2518 PRINT
2520 PRINT "CALIBRATION OR PEAK PLOTTING ([C] OR P) ";
2530 GOSUB 5100
2534 ON POS("CP",A$,1) THEN GOTO 2542, 2548
2538 PRINT "<7>";
2540 GOTO 2518
2542 LET P2$=P$,".08"
2544 ON ERR THEN GOTO 2190
2545 NOESC
2546 CHAIN P2$ THEN GOTO 2950
2548 LET P2$=P$,".09"
2550 ON ERR THEN GOTO 2190
2551 NOESC
2552 CHAIN P2$ THEN GOTO 4000
2554 ON ERR THEN GOTO 2190
2556 NOESC
2558 CHAIN P2$
2560 LET P2$=P$,".00"
2562 CLOSE
2564 GOTO 2554
2600 GOTO 2608
2602 PRINT "   K - CHANGE COMPUTATIONAL MODE (ZLQCI)"
2604 PRINT "   D - CHANGE DATA ACQUISITION MODE"
2606 PRINT "   O - CHANGE OUTPUT MODE (TLBN)"
2608 LET A$=""
2610 IF LEN(C$)>1 THEN LET A$=C$[2]
2612 IF LEN(A$)>0 THEN GOTO 2632
2614 PRINT
2618 PRINT "MODE EDIT OPTIONS: ([H]KDO) ";
2620 GOSUB 5100
2632 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2638
2634 GOTO 2602

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 STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                  PAGE  5
              PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2638 ON POS("KDO",A$[1,1],1) THEN GOTO 2660, 2908, 2928
2644 PRINT "<7>";
2646 GOTO 2614
2660 GOTO 2672
2662 PRINT "   Z - FORCED ZERO LINEAR"
2664 PRINT "   L - REGULAR LINEAR"
2666 PRINT "   Q - QUADRATIC"
2668 PRINT "   C - CUBIC"
2670 PRINT "   I - INTERPOLATION"
2672 IF LEN(A$)=1 THEN LET A$=""
2673 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2674 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2675 IF LEN(A$)>0 THEN GOTO 2692
2676 PRINT
2678 PRINT "COMPUTATIONAL MODE: ([H]ZLQCI) ";
2680 GOSUB 5100
2692 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2696
2694 GOTO 2662
2696 LET M0=POS("ZLQCI",A$,1)
2698 IF M0>0 THEN GOTO 2704
2700 PRINT "<7>";
2702 GOTO 2676
2704 LET M0=M0-1
2706 IF K0=0 THEN GOTO 2904
2710 IF M0=4 THEN GOTO 2750
2720 IF M0<S0 THEN GOTO 2904
2730 PRINT "<7>ILLEGAL MODE!<7>";
2740 GOTO 2700
2750 IF S0<2 THEN GOTO 2730
2760 GOTO 2904
2840 LET M1=1
2842 LET R=0
2844 PRINT "<13>NUMBER OF REPLICATES ";
2846 ON ERR THEN GOTO 5000
2848 ON ESC THEN GOTO 1000
2850 INPUT "> ",R1;
2852 ON ESC THEN GOSUB 8500
2854 ON ERR THEN STOP
2856 PRINT
2858 IF R1>0 THEN IF R1<7 THEN IF INT(R1)=R1 THEN GOTO 2864
2860 PRINT "<7>";
2862 GOTO 2840

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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 STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                  PAGE  6
              PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2864 PRINT "<13>STARTING POSITION ";
2866 ON ERR THEN GOTO 5000
2868 ON ESC THEN GOTO 1000
2870 INPUT "> ",W;
2872 ON ESC THEN GOSUB 8500
2874 ON ERR THEN STOP
2876 PRINT
2878 IF W>=1 THEN IF W<=W0 THEN IF W=INT(W) THEN GOTO 2884
2880 PRINT "<7>";
2882 GOTO 2864
2884 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
2886 IF M2=0 THEN GOTO 2904
2888 PRINT "<13>SET WHEEL POSITION TO ";W
2890 PRINT "SET REPLICATE COUNTER TO ";R1
2892 PRINT "PRESS RETURN WHEN READY ";
2900 GOSUB 5100
2904 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2906 GOTO 1000
2908 LET M2$="KEYBOARDCOMPUTER"
2910 PRINT
2912 PRINT "CHANGE FROM ";M2$[M2*8+1,(M2+1)*8];
2914 ON M2+1 THEN GOTO 2920, 2916
2916 LET M2=0
2918 GOTO 2924
2920 LET M2=1
2922 IF Z9=0 THEN LET M2=0
2924 PRINT " TO ";M2$[M2*8+1,(M2+1)*8];" ACQUISITION."
2926 GOTO 2904
2928 GOTO 2944
2930 PRINT "   T - TERMINAL"
2934 PRINT "   L - LINEPRINTER"
2936 PRINT "   B - BOTH TERMINAL AND LINEPRINTER"
2938 PRINT "   N - NONE"
2944 IF LEN(A$)=1 THEN LET A$=""
2945 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2946 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2947 IF LEN(A$)>0 THEN GOTO 2964
2948 PRINT
2950 PRINT "OUTPUT OPTIONS: ([H]TLBN) ";
2960 GOSUB 5100
2964 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2968
2966 GOTO 2930

1234567891123456789212345678931234567894123456789512345678961234567897
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         0         0         0         0         0         0         0
2968 LET M5=POS("TLBN",A$,1)
2970 IF M5>0 THEN GOTO 2976
2972 PRINT "<7>";
2974 GOTO 2948
2976 LET M5=M5-1
2978 GOTO 2904
2980 LET M1=0
2982 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2984 GOTO 1000
3000 IF M2=0 THEN GOTO 3990
3002 LET V1=-9999
3100 READ FILE[2,16],Z0,Z1,Z2,Z3,Z5,Z6
3110 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
3120 READ FILE[2,18],Z1$,Z2$,Z3$,Z4$,Z5$
3130 LET Z5$=I1$
3140 LET Z4$=S0$[D1[3]*15+1,(D1[3]+1)*15]
3142 REM ############ PE 5000 ROUTINE ##########################
3150 IF Z9>0 THEN GOTO 3170
3152 LET C=25911
3154 LET D=0
3156 CALL 257,C,D
3170 DIM B$[50],S$[95]
3180 LET S$=" !<34>#$%&'()*+,-./0123456789:;<=>?@"
3190 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_@"
3200 LET S$=S$,"ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^"
3210 LET A=0
3220 LET V1=-9999
3230 LET B$=""
3240 ON ESC THEN GOTO 2980
3242 CALL 40,A
3244 ON ESC THEN GOSUB 8500
3246 PRINT USING "### ",A;
3250 IF A=10 THEN GOTO 3320
3260 IF A>=32 THEN IF A<=126 THEN GOTO 3290
3280 GOTO 3240
3290 LET L=A-31
3300 LET B$=B$,S$[L,L]
3310 GOTO 3240
3320 PRINT
3321 LET P6=POS(B$,"65",1)
3322 LET B$=B$[P6+2]
3323 PRINT B$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3324 IF POS("ZEROMEANSDEVNUM ",B$[1,4],1)>0 THEN GOTO 3230
3325 IF POS("CW",B$[LEN(B$)],1)>0 THEN GOTO 3400
3326 IF POS("HA",B$[8,8],1)=0 THEN GOTO 3400
3329 ON ERR THEN GOTO 3400
3340 LET P8=POS(B$,".",1)
3350 IF P8=0 THEN GOTO 3400
3352 LET P7=POS(B$,".",P8+1)
3354 IF P7<>0 THEN GOTO 3400
3360 LET V1=VAL(B$[P8-2,P8+3])
3370 LET Z9=Z9+1
3380 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
3382 ON ERR THEN STOP
3390 GOTO 3980
3400 ON ERR THEN STOP
3410 FOR I=1 TO 7
3420   PRINT "<7>";
3430   DELAY =.3
3440 NEXT I
3450 GOTO 3380
3460 REM ##################################################
3980 PRINT "  MEASURED ABS = ";V1;
3982 IF V1<>-9999 THEN GOTO 4001
3984 PRINT "<7>   DATA ERROR!<7>";
3986 IF M2=1 THEN PRINT "<7>SEQUENCING IS BEING TERMINATED!<7>";
3988 PRINT
3989 GOTO 2980
3990 PRINT "  MEASURED ABS ";
3992 ON ERR THEN GOTO 5000
3993 ON ESC THEN GOTO 2980
3994 INPUT "> ",V1;
3995 ON ESC THEN GOSUB 8500
3996 ON ERR THEN STOP
4000 GOTO 3982
4001 IF K0<>1 THEN GOTO 4020
4002 IF D1[3]=1 THEN GOTO 4020
4003 IF D1[3]<>7 THEN IF D1[3]<>9 THEN IF V1<X0 THEN GOTO 4006
4004 GOTO 4010
4006 PRINT  TAB(20);"<7>OFF SCALE LOW!"
4008 GOTO 4030
4010 IF V1<=X9 THEN GOTO 4020
4012 PRINT  TAB(20);"<7>OFF SCALE HIGH!"
4014 GOTO 4030

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    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                     PAGE  9
                PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4020 PRINT
4030 IF D1[3]<>9 THEN GOTO 4032
4031 LET B9=V1
4032 IF D1[7]+1<=6 THEN GOTO 4060
4035 PRINT
4040 PRINT "  <7>TOO MANY REPLICATES!<7>"
4050 GOTO 4100
4060 LET D1[7]=D1[7]+1
4062 LET D1[D1[7]+7]=V1
4064 LET D1[6]=0
4066 FOR J=1 TO D1[7]
4068   LET D1[6]=D1[6]+D1[J+7]
4070 NEXT J
4072 LET D1[6]=D1[6]/D1[7]
4080 GOSUB 7200
4100 FOR I=0 TO 3
4110   IF INT(I*I+5E-02)=D1[3] THEN GOTO 4200
4115 NEXT I
4120 IF K0=1 THEN GOTO 4150
4140 GOTO 4200
4150 IF D1[7]=0 THEN GOTO 4200
4152 LET S=V1
4154 GOSUB 8000
4156 LET G1=C1
4170 PRINT "  CALC CONC   = ";G1;
4200 PRINT "  AVE.ABS= ";D1[6];
4220 PRINT "  NO.REPS = ";D1[7]
4230 IF D1[7]=0 THEN GO[illegible] 1000
4235 PRINT  TAB(1);
4240 FOR I=1 TO D1[7]
4250   PRINT I;">";D1[I+7];"  ";
4260 NEXT I
4270 PRINT
4280 LET D=1
4290 ON D1[3] THEN GOTO 1000, 4320, 4310, 4800, 4340, 4350, 4350
4300 GOTO 1000
4310 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
4315 GOTO 4350
4320 LET D=(D1[4]+D1[5])/D1[4]
4330 GOTO 4350
4340 LET D=(D2[4]+D2[5])/D2[4]
4350 IF K0=1 THEN GOTO 4390

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                     PAGE 10
                PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4380 GOTO 1000
4390 LET S=D1[6]
4400 GOSUB 8000
4410 LET G2=C1
4440 PRINT "  CURRENT CONC      = ";G2;"(";MO$[(J0-1)*4+1,J0*4];")"
4445 IF D=1 THEN GOTO 4460
4450 PRINT "  DIL FACTOR        = ";D
4460 LET G3=G2*D
4480 PRINT "    RPT CONC (";I1$[12,14];")   = ";G3
4490 ON D1[3] THEN GOTO 1000, 1000, 4530, 4800, 4620, 4710, 4760
4495 GOTO 1000
4530 IF D2[7]=0 THEN GOTO 1000
4540 LET S=D2[6]
4550 GOSUB 8000
4560 LET G4=C1*(D2[4]+D2[5])/D2[4]
4562 LET M=D1[4]*D1[5]
4564 IF D1[4]=0 THEN LET M=D1[5]
4566 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
4570 PRINT "    RPT CONC (";I2$[12,14];")   = ";G4
4580 PRINT "    RPT SPIKE (LSA)  = ";G5
4582 IF G5=0 THEN GOTO 4619
4584 LET Q=(G3-G4)*100/G5
4586 PRINT "    % RECOVERY        = ";Q;"%"
4587 PRINT "    QC MESSAGE        > ";
4588 FOR J=1 TO 5
4590   IF D1[3]<>3 THEN GOTO 4594
4592   IF Q>D2[13+J] THEN GOTO 4600
4593   GOTO 4596
4594   IF Q>D1[13+J] THEN GOTO 4600
4596 NEXT J
4598 LET J=6
4600 ON J THEN GOTO 4602, 4606, 4610, 4610, 4614, 4618
4602 PRINT "<7><7><7>OUT HIGH!<7><7><7>"
4604 GOTO 4619
4606 PRINT "<7><7>WARN HIGH!<7><7>"
4608 GOTO 4619
4610 PRINT "QC OK"
4612 GOTO 4619
4614 PRINT "<7><7>WARN LOW!<7><7>"
4616 GOTO 4619
4618 PRINT "<7><7><7>OUT LOW!<7><7><7>"
4619 GOTO 1000

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                       PAGE 11
                    PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4620 IF D2[7]=0 THEN GOTO 1000
4630 LET S=D2[6]
4640 GOSUB 8000
4650 LET G4=C1*D
4660 PRINT "    RPT CONC (";I2$[12,14];")   = ";G4
4665 LET X=(G3+G4)/2
4670 PRINT "    XBAR (AVE)         = ";X
4675 LET R9=ABS(G3-G4)
4680 PRINT "    R (CRIT DIFF)      = ";R9
4682 PRINT "    QC MESSAGE         > ";
4684 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 4690
4686 PRINT "QC OK!"
4688 GOTO 4700
4690 PRINT "<7><7><7>OUT!<7><7><7>"
4700 GOTO 1000
4710 PRINT "    THEOR CONC (LCT) = ";D1[5]
4720 IF D1[5]=0 THEN GOTO 4750
4725 LET Q=100*G3/D1[5]
4730 PRINT "    % RECOVERY         = ";Q;"%"
4740 GOTO 4587
4750 GOTO 1000
4760 LET Q=G3
4770 GOTO 4587
4800 IF D2[7]=0 THEN GOTO 1000
4802 LET X=V1
4810 PRINT "    ABS OF CHK STD   = ";X
4820 PRINT "    ABS OF CAL STD   = ";D2[6]
4825 IF D2[6]=0 THEN GOTO 4850
4827 LET Q=100*X/D2[6]
4830 PRINT "    % RECOVERY         = ";Q;"%"
4840 GOTO 4587
4850 GOTO 1000
5000 PRINT "<7> ";
5010 RETRY
5100 ON ERR THEN GOTO 5000
5110 ON ESC THEN GOTO 1000
5120 INPUT "> ",A$;
5130 ON ESC THEN GOSUB 8500
5140 ON ERR THEN STOP
5150 PRINT
5160 RETURN
6980 REM [  READ/WRITE (.DF) SUBROUTINES   ]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                       PAGE 12
                    PROGRAM LISTING FOR E520G77504.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
6990 REM ####################################
7000 MAT READ FILE[1,W1],D1
7010 READ FILE[0,W1],I1$
7020 RETURN
7100 MAT READ FILE[1,W2],D2
7110 READ FILE[0,W2],I2$
7120 RETURN
7200 MAT WRITE FILE[1,W1],D1
7210 WRITE FILE[0,W1],I1$
7220 RETURN
7300 MAT WRITE FILE[1,W2],D2
7310 WRITE FILE[0,W2],I2$
7320 RETURN
8000 LET J0=M0+1
8005 IF J0=5 THEN GOTO 8090
8010 READ FILE[2,4+J0],N,D0,P[1],P[2],P[3],P[4],P[5],P[6]
8020 IF P[5]=0 THEN GOTO 8070
8030 LET J0=J0-1
8040 IF J0>=1 THEN GOTO 8010
8050 LET C1=0
8060 RETURN
8070 LET C1=P[1]+S*(P[2]+S*(P[3]+S*P[4]))
8080 GOTO 8060
8090 READ FILE[2,5],N
8092 IF N<=1 THEN GOTO 8140
8095 FOR I=1 TO N-1
8100   READ FILE[2,19+I],R7,C7
8110   READ FILE[2,20+I],R8,C8
8120   IF S>=R7 THEN IF S<R8 THEN GOTO 8400
8130 NEXT I
8140 LET J0=1
8150 GOTO 8010
8400 LET C1=C7+((S-R7)*(C8-C7))/(R8-R7)
8410 RETURN
8500 NOESC
8510 READ FILE[2,15],M0,M1,R1,M2,M5,E5
8520 LET E5=E5+1
8525 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
8540 ESC
8550 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE 13
                       SYMBOL TABLE FOR E520G77504.AS

SYMBOL     REFERENCES
------   ---------------------------------------------------------------
 1000    2092  2210  2848  2868  2906  2984  4230  4290  4300  4380
         4490  4495  4530  4619  4620  4700  4750  4800  4850  5110
 1009    1002
 1060    1030
 1070    1010
 1110    1012  1060
 1130    1050  1100
 2000    1009
 2012    1140  2009
 2020    2116
 2110    2014
 2120    2116
 2190    2002  2117  2120  2130  2160  2544  2550  2554
 2220    2170
 2295    2291
 2300    2290
 2350    2295
 2360    2293  2298  2330
 2380    2116
 2500    2116
 2504    2116
 2508    2116
 2512    2116
 2518    2540
 2534    2516
 2542    2534
 2548    2534
 2554    2382  2502  2506  2510  2564
 2560    2116
 2600    2116
 2602    2634
 2608    2600
 2614    2646
 2632    2612
 2638    2632
 2660    2638
 2662    2694
 2672    2660
 2676    2702
 2692    2675
 2696    2692
 2700    2740
 2704    2698
 2730    2750
 2750    2710
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE 14
                       SYMBOL TABLE FOR E520G77504.AS

SYMBOL     REFERENCES
------   ---------------------------------------------------------------
 2840    2116  2862
 2864    2858  2882
 2884    2878
 2904    2706  2720  2760  2886  2926  2978
 2908    2638
 2916    2914
 2920    2914
 2924    2918
 2928    2638
 2930    2966
 2944    2928
 2948    2974
 2950    2546
 2964    2947
 2968    2964
 2976    2970
 2980    3240  3989  3993
 3000    2360
 3170    3150
 3230    3324
 3240    3280  3310
 3290    3260
 3320    3250
 3380    3450
 3400    3325  3326  3329  3350  3354
 3980    3390
 3982    4000
 3990    3000
 4000    2552
 4001    3982
 4006    4003
 4010    4004
 4020    4001  4002  4010
 4030    4008  4014
 4032    4030
 4060    4032
 4100    4050
 4150    4120
 4200    4110  4140  4150
 4310    4290
 4320    4290
 4340    4290
 4350    4290  4315  4330
 4390    4350
 4460    4445
```

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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE 15
                     SYMBOL TABLE FOR E520G77504.AS

SYMBOL    REFERENCES
------    ----------------------------------------------------------------

 4530    4490
 4587    4740  4770  4840
 4594    4590
 4596    4593
 4600    4592  4594
 4602    4600
 4606    4600
 4610    4600
 4614    4600
 4618    4600
 4619    4582  4604  4608  4612  4616
 4620    4490
 4690    4684
 4700    4688
 4710    4490
 4750    4720
 4760    4490
 4800    4290  4490
 4850    4825
 5000    2846  2866  3992  5100
 5100    2530  2620  2680  2900  2960
 7000    2225
 7100    2300
 7200    4080
 8000    4154  4400  4550  4640
 8010    8040  8150
 8060    8080
 8070    8020
 8090    8005
 8140    8092
 8400    8120
 8500    0009  1001  2192  2852  2872  3244  3995  5130
 A       3210  3242  3246  3250  3260  3290
 A$      2512  2514  2516  2534  2608  2610  2612  2632  2638  2672
         2673  2674  2675  2692  2696  2944  2945  2946  2947  2964
         2968  5120
 B$      3170  3230  3300  3321  3322  3323  3324  3325  3326  3340
         3352  3360
 B0      0110
 B9      0088  4031
 C       3152  3156
 C$      0120  1040  1070  1120  2004  2009  2012  2014  2110  2120
         2125  2130  2150  2160  2514  2610  2674  2884  2946
 C0      2110  2116
 C0$     0030  2110
```

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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE 16
                     SYMBOL TABLE FOR E520G77504.AS

SYMBOL    REFERENCES
------    ----------------------------------------------------------------

 C1      4156  4410  4560  4566  4650  8050  8070  8400
 C7      8100  8400
 C8      8110  8400
 D       3154  3156  4280  4310  4320  4340  4445  4450  4460  4650
 D0      8010
 D0$     0024  0100  0104
 D1      7000  7200
 D1[     0022  2270  2280  3140  4002  4003  4030  4032  4060  4062
         4064  4066  4068  4072  4110  4150  4200  4220  4230  4240
         4250  4290  4310  4320  4390  4490  4562  4564  4566  4590
         4594  4710  4720  4725
 D2      7100  7300
 D2[     0022  2310  4310  4340  4530  4540  4560  4566  4592  4620
         4630  4684  4800  4820  4825  4827
 E5      1000  1002  1004  1006  1130  2904  2982  8510  8520  8525
 F4$     0105
 F7$     0100  0104
 FL#0    7010  7110  7210  7310
 FL#1    7000  7100  7200  7300
 FL#2    0100  0104  0110  0120  0130  0140  1000  1006  1130  2012
         2884  2904  2982  3100  3110  3120  3380  8010  8090  8100
         8110  8510  8525
 G1      4156  4170
 G2      4410  4440  4460
 G3      4460  4480  4584  4665  4675  4725  4760
 G4      4560  4570  4584  4650  4660  4665  4675
 G5      4566  4580  4582  4584
 I       2125  2130  2140  3410  3440  4100  4110  4115  4240  4250
         4260  8095  8100  8110  8130
 I1$     0020  2270  3130  4480  7010  7210
 I2      0066
 I2$     0020  4570  4660  7110  7310
 J       4066  4068  4070  4588  4592  4594  4596  4598  4600
 J0      4440  8000  8005  8010  8030  8040  8140
 K0      0086  0120  2012  2706  2884  4001  4120  4350
 L       3290  3300
 M       4562  4564  4566
 M0      0080  1000  1006  1130  2696  2698  2704  2710  2720  2904
         2982  8000  8510  8525
 M0$     0020  0028  4440
 M1      0082  1000  1003  1006  1009  1080  1130  2840  2904  2980
         2982  8510  8525
 M2      0084  1000  1006  1130  2886  2904  2912  2914  2916  2920
         2922  2924  2982  3000  3986  8510  8525
 M2$     0024  2908  2912  2924
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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                          PAGE 17
                     SYMBOL TABLE FOR E520G77504.AS

SYMBOL    REFERENCES
------    ------------------------------------------------------------------
M5        1000  1006  1130  2904  2968  2970  2976  2982  8510  8525
N         8010  8090  8092  8095
N0        0140  3110  3380
N1        0140  3110  3380
N2        0140  3110  3380
N5        0120  2012  2884
P$        0100  0102  0103  0104  0105  0106  0107  0108  2380  2542
          2548  2560
P0$       0100  0101  0104
P1$       0100  0101  0102  0104
P2$       0100  0103  0104  2380  2500  2504  2508  2542  2546  2548
          2552  2558  2560
P5$       0106  2500
P6        3321  3322
P6$       0107  2504
P7        3352  3354
P7$       0108  2508
P8        3340  3350  3352  3360
P9        0140  3110  3380
P[        0022  8010  8020  8070
Q         4584  4586  4592  4594  4725  4730  4760  4827  4830
R         0075  0120  1012  1015  1110  2012  2842  2884
R0        0110
R0$       0100  0104
R1        0068  1000  1006  1012  1095  1130  2850  2858  2890  2904
          2982  8510  8525
R1$       0012  0130
R2$       0012  0130
R3$       0012  0130
R4$       0012  0130
R7        8100  8120  8400
R8        8110  8120  8400
R9        4675  4680  4684
S         4152  4390  4540  4630  8070  8120  8400
S$        3170  3180  3190  3200  3300
S0        0110  2720  2750
S0$       0020  0040  0050  0060  2270  2310  3140
S1$       0020
S9        0090  0110  1030
T0        0110
U0        0110
U1$       0120  2012  2884
U2$       0120  2012  2884
V1        3002  3220  3360  3980  3982  3994  4003  4010  4031  4062
          4152  4802
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                          PAGE 18
                     SYMBOL TABLE FOR E520G77504.AS

SYMBOL    REFERENCES
------    ------------------------------------------------------------------
V[        0022
W         0070  0120  1010  1020  1030  1060  1090  1120  2012  2870
          2878  2884  2888
W0        0092  0110  1010  1060  2170  2878
W1        2150  2160  2170  2260  2290  7000  7010  7200  7210
W2        2280  2290  2291  2295  2320  7100  7110  7300  7310
X         4665  4670  4684  4802  4810  4827
X0        0120  2012  2884  4003
X9        0120  2012  2884  4010
Y0        0110
Y9        0110
Z0        3100
Z1        3100
Z1$       3120
Z2        3100
Z2$       3120
Z3        3100
Z3$       3120
Z4$       0024  3120  3140
Z5        3100
Z5$       0024  3120  3130
Z6        3100
Z7        0140  3110  3380
Z8        0140  3110  3380
Z9        0140  2922  3110  3150  3370  3380
```

TABLE 9. SYMBOL DEFINITIONS FOR ISCN.04 FOR PERKIN-ELMER 403/503 FURNACE ADAPTATION

A1	the mean baseline absorbance
A2	the number of signal readings used to compute A1 and A3
A3	the standard deviation of the mean baseline absorbance
A$	a general purpose answer string
B9	the absorbance of the last measured instrument blank
C$	the current IRCL command string
C0	the command string router variable
C0$	the master IRCL option string
C1	the computed concentration of a sample
C7	an interpolation variable - low concentration
C8	an interpolation variable - high concentration
D	the dilution factor for a sample
D0	the degree of a regression equation
D0$	the date code of the Run File
D1()	the data array for the current sample
D2()	the data array for a previous (primary) QC member
E5	the ESCape counter
F4$	the name of the peak plot file
F7$	the name of the Run File
G1	the calculated (average) concentration
G2	the current concentration (C1)
G3	the calculated concentration of the primary QC member (LD1, LSO, LDX)
G4	the reported concentration
G5	the reported spike value (LSA)
H0, H2	the highest absorbance signal
I	a general purpose variable
I0	the array position of the lowest absorbance signal
I1	the array position offset of the peak absorbance from the highest absorbance
I1$	the identifier string for the current sample
I2	the array position of the highest absorbance signal
I2$	the identifier string for a previous (primary) QC member
I3	the array position of the peak absorbance (I2 + I1)
I9	the array position of the highest absorbance signal
J	a counter
J0	a computational mode flag
K	a counter
K0	the calibration flag
L0	the lowest absorbance signal
M	the mass of the spike
M0	the computational mode flag
M0$	the computational mode super-string
M1	the sequencing mode flag
M2	the data acquisition flag
M2$	the data acquisition mode super-string
M5	the output mode flag
N	an interpolation variable - the number of standards

TABLE 9 (Contd.)

N0	the quantity of peak data points
N1	the quantity of leading baseline points
N2	the total number of data points
N3,N4	the starting and ending array positions of the peak
N5	the number of standards calibrated
P1,P2,P3	the zeroth, first and second degree quadratic coefficients of the least squares approximation
P$	the program and file prefix
P0$	the name of the program last executed
P1$	the name of the current program (.04)
P2$	the dummy name of the next executable program
P5$	the name of the calibration program
P6$	the name of the interim report generator program
P7$	the name of the Final Report generator program
P()	the coefficient array for regression equations
Q	the QC assessment variable
R	the replicate counter
R0$	the generic PARMETH code in a Run File
R1	the number of replicate measurements made on a sample
R1$	the analyst's initial string
R2$	the analyte string
R3$	the concentration unit string
R4$	the instrument name string
R7	an interpolation variable - low absorbance
R8	an interpolation variable - high absorbance
R9	the difference between duplicates
S	the absorbance of a sample
S0	the number of calibration standards in a wheel pattern
S0$	the sample descriptor super-string
S9	the position at which calibration is to occur
T0	the number of timing set standards in a wheel pattern
T9	a transmittance-to-absorbance conversion variable
U0	the number of unknowns in a wheel pattern
U1$	the format string for absorbance values
U2$	the format string for concentration values
V1	the baseline-corrected peak absorbance
V2	the determined peak absorbance
V()	the raw peak data array
W	the wheel position counter
W0	the number of samples in a wheel pattern
W1	the current wheel position
W2	the wheel position of a previous (primary) QC member
X	a QC assessment variable
X0	the lowest absorbance for calibration standards
X9	the highest absorbance for calibration standards
Z0	the channel for SYNC reset (HGA/NOVA)
Z1	the channel for NOVA ready-set
Z1$	the double/single channel indicator
Z2	the channel for "sense" reset
Z2$	the peak height indicator

TABLE 9 (Cont'd)

Z3	the CALL 257 dummy accumulator
Z3$	the leading baseline indicator
Z4$	the sample type descriptor
Z5	the channel for CALL with "sense"
Z5$	the sample identifier
Z6	the delay time (in clock ticks) before data acquisition
Z7	the sampling frequency (in clock ticks)
Z8	the quantity of available points in the CALL 7
Z9	the injection/measurement counter

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6/4/1981                                                        PAGE  1
                 PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0001 REM #=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#
0002 REM #   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) #
0003 REM #   PROGRAM: ISCN.04 - RUN CONTROL PROGRAM; INCLUDES IRCL,  #
0004 REM #            MEAS, MODE CHNG; CHAINS 00,05,06,07,08,09,&12  #
0005 REM #            FOR PE503,CRLV,RM000,FLAMELESS,J.MORRIS,GSC2   #
0006 REM #   BY D.RYAN (UCCC), MAY 29, 1979                          #
0007 REM #   MOST RECENT REVISION: APRIL 14, 1980                    #
0008 REM #=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#=#
0009 ON ESC THEN GOSUB 8500
0010 ESC
0012 DIM R1$[4],R2$[2],R3$[8],R4$[16]
0020 DIM S0$[150],M0$[20],I1$[15],I2$[15],S1$[80]
0022 DIM D1[25],D2[25],P[6],V[300]
0024 DIM D0$[20],Z4$[20],Z5$[20],M2$[20]
0028 LET M0$="FZERLINRQUADCUBCINTR"
0030 LET C0$="HMCRE3AUP1"
0040 LET S0$="TIMING SET STD  INSTR CAL STD UNKNOWN SAMPLE    SPIKE  0
*    F    "
0050 LET S0$=S0$,"   CHECK  OF    DUPLICATE  OF  LAB CNTRL STD "
0060 LET S0$=S0$," REAGENT BLANK  SURROGATE SPK   INSTR BLANK  "
0062 LET A7$="0"
0064 LET A8$="0"
0066 LET I2=1
0068 LET R1=0
0070 LET W=0
0075 LET R=0
0080 LET M0=1
0082 LET M1=0
0084 LET M2=0
0086 LET K0=0
0088 LET B9=0
0090 LET S9=0
0092 LET W0=0
0100 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0101 LET P0$=P$,".03"
0102 LET P1$=P$,".04"
0103 LET P2$=P$,".XY"
0104 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0105 LET F4$=P$,".PK"
0106 LET P5$=P$,".05"
0107 LET P6$=P$,".06"
0108 LET P7$=P$,".07"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE  2
                 PROGRAM LISTING FOR C000G50304.AS

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         0         0         0         0         0         0         0
0109 LET P8$=P$,".08"
0110 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0120 READ FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
0130 READ FILE[2,9],R1$,R2$,R3$,R4$
0140 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
1000 READ FILE[2,15],M0,M1,R1,M2,M5,E5
1001 ON ESC THEN GOSUB 8500
1002 IF E5=0 THEN GOTO 1009
1003 LET M1=0
1004 LET E5=0
1006 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1009 IF M1=0 THEN GOTO 2000
1010 IF W>W0+1 THEN GOTO 1070
1012 IF R+1<=R1 THEN GOTO 1110
1015 LET R=0
1020 LET W=W+1
1030 IF W<>S9 THEN GOTO 1060
1040 LET C$="C"
1050 GOTO 1130
1060 IF W<=W0 THEN GOTO 1110
1070 LET C$="R"
1080 LET M1=0
1090 LET W=0
1095 LET R1=1
1100 GOTO 1130
1110 LET R=R+1
1120 LET C$="M",STR$(W)
1130 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1140 GOTO 2012
2000 PRINT
2001 PRINT "INSTRUMENT RUN OPTIONS: ([H]MCRE3AUP1) ";
2002 ON ERR THEN GOTO 2190
2003 NOESC
2004 INPUT " > ",C$;
2005 ESC
2006 ON ERR THEN STOP
2007 PRINT
2008 REM##############################
2009 IF C$<>"DPR" THEN GOTO 2012
2010 STOP
2011 REM##############################
2012 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$

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EPA-287 (Cin.)
(4-76)

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 STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE  3
                  PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2014 IF LEN(C$)>0 THEN GOTO 2110
2020 PRINT "    M[POS]  MEASURE SAMPLE IN POS"
2050 PRINT "    C       CALIBRATE STANDARDS"
2060 PRINT "    R       REPORT STATUS"
2070 PRINT "    E$[POS] EDIT ABS OR DILUTION DATA (S[POS],P,D[POS])"
2080 PRINT "    3       ACCESS FINISH COMMAND LEVEL(3)"
2084 PRINT "    A       START AUTOMATIC RUN-SEQUENCE (WITH POS/REPS)"
2086 PRINT "    U$      USER EDIT OF RUN-MODES (K,D,O)"
2088 PRINT "    P$      PLOT CALIBRATION OR PEAK DATA (C OR P)"
2090 PRINT "    1       EXIT IRCL(2) TO ASCL(1)"
2092 GOTO 1000
2110 LET CO=POS(CO$,C$[1,1],1)
2116 ON CO THEN GOTO 2020, 2120, 2500, 2504, 2380, 2508, 2840, 2600, 2
*    512, 2560
2117 GOTO 2190
2120 IF LEN(C$)<=1 THEN GOTO 2190
2125 FOR I=1 TO LEN(C$[2])
2130   IF C$[I+1,I+1]<"0" THEN IF C$[I+1,I+1]>"9" THEN GOTO 2190
2140 NEXT I
2150 LET W1=VAL(C$[2])
2160 IF STR$(W1)<>C$[2] THEN GOTO 2190
2170 IF INT(W1)=W1 THEN IF W1>=1 THEN IF W1<=W0 THEN GOTO 2220
2190 ON ERR THEN STOP
2192 ON ESC THEN GOTO 8500
2195 PRINT
2200 PRINT "<7>OPTION ERROR<7>"
2210 GOTO 1000
2220 PRINT
2225 GOSUB 7000
2260 PRINT USING "MEAS POS ### ",W1;
2270 PRINT "/";I1$;"/";S0$[D1[3]*15+1,(D1[3]+1)*15];
2280 LET W2=D1[2]
2290 IF W2<W1 THEN IF W2>=1 THEN GOTO 2300
2291 IF W2<>0 THEN GOTO 2295
2292 PRINT
2293 GOTO 2360
2295 IF W2=-1 THEN GOTO 2350
2298 GOTO 2360
2300 GOSUB 7100
2310 PRINT S0$[D2[3]*15+1,(D2[3]+1)*15];
2320 PRINT USING " IN POS ###",W2
2330 GOTO 2360

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 STANDARD  - CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE  4
                  PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2350 PRINT " (HAS QC)"
2360 GOTO 3000
2380 LET P2$=P$,".12"
2382 GOTO 2554
2500 LET P2$=P5$
2502 GOTO 2554
2504 LET P2$=P6$
2506 GOTO 2554
2508 LET P2$=P7$
2510 GOTO 2554
2512 LET A$=""
2514 IF LEN(C$)>1 THEN LET A$=C$[2,2]
2516 IF LEN(A$)>0 THEN GOTO 2534
2518 PRINT
2520 PRINT "CALIBRATION OR PEAK PLOTTING ([C] OR P) ";
2530 GOSUB 5100
2534 ON POS("CP",A$,1) THEN GOTO 2542, 2548
2538 PRINT "<7>";
2540 GOTO 2518
2542 LET P2$=P$,".08"
2544 ON ERR THEN GOTO 2190
2545 NOESC
2546 CHAIN P2$ THEN GOTO 2950
2548 LET P2$=P$,".09"
2550 ON ERR THEN GOTO 2190
2551 NOESC
2552 CHAIN P2$ THEK GOTO 4000
2554 ON ERR THEN GOTO 2190
2556 NOESC
2558 CHAIN P2$
2560 LET P2$=P$,".00"
2562 CLOSE
2564 GOTO 2554
2600 GOTO 2608
2602 PRINT "    K - CHANGE COMPUTATIONAL MODE (ZLQCI)"
2604 PRINT "    D - CHANGE DATA ACQUISITION MODE"
2606 PRINT "    O - CHANGE OUTPUT MODE (TLBN)"
2608 LET A$=""
2610 IF LEN(C$)>1 THEN LET A$=C$[2]
2612 IF LEN(A$)>0 THEN GOTO 2632
2614 PRINT
2618 PRINT "MODE EDIT OPTIONS: ([H]KDO) ";

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   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                      PAGE  5
                     PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2620 GOSUB 5100
2632 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2638
2634 GOTO 2602
2638 ON POS("KDO",A$[1,1],1) THEN GOTO 2660, 2908, 2928
2644 PRINT "<7>";
2646 GOTO 2614
2660 GOTO 2672
2662 PRINT "   Z - FORCED ZERO LINEAR"
2664 PRINT "   L - REGULAR LINEAR"
2666 PRINT "   Q - QUADRATIC"
2668 PRINT "   C - CUBIC"
2670 PRINT "   I - INTERPOLATION"
2672 IF LEN(A$)=1 THEN LET A$=""
2673 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2674 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2675 IF LEN(A$)>0 THEN GOTO 2692
2676 PRINT
2678 PRINT "COMPUTATIONAL MODE: ([H]ZLQCI) ";
2680 GOSUB 5100
2692 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2696
2694 GOTO 2662
2696 LET M0=POS("ZLQCI",A$,1)
2698 IF M0>0 THEN GOTO 2704
2700 PRINT "<7>";
2702 GOTO 2676
2704 LET M0=M0-1
2706 IF K0=0 THEN GOTO 2904
2710 IF M0=4 THEN GOTO 2750
2720 IF M0<S0 THEN GOTO 2904
2730 PRINT "<7>ILLEGAL MODE!<7>";
2740 GOTO 2700
2750 IF S0<2 THEN GOTO 2730
2760 GOTO 2904
2840 LET M1=1
2842 LET R=0
2844 PRINT "<13>NUMBER OF REPLICATES ";
2846 ON ERR THEN GOTO 5000
2848 ON ESC THEN GOTO 1000
2850 INPUT "> ",R1;
2852 ON ESC THEN GOSUB 8500
2854 ON ERR THEN STOP
2856 PRINT

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   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                      PAGE  6
                     PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2858 IF R1>0 THEN IF R1<7 THEN IF INT(R1)=R1 THEN GOTO 2864
2860 PRINT "<7>";
2862 GOTO 2840
2864 PRINT "<13>STARTING POSITION ";
2866 ON ERR THEN GOTO 5000
2868 ON ESC THEN GOTO 1000
2870 INPUT "> ",W;
2872 ON ESC THEN GOSUB 8500
2874 ON ERR THEN STOP
2876 PRINT
2878 IF W>=1 THEN IF W<=W0 THEN IF W=INT(W) THEN GOTO 2884
2880 PRINT "<7>";
2882 GOTO 2864
2884 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
2886 IF M2=0 THEN GOTO 2904
2888 PRINT "<13>SET WHEEL POSITION TO ";W
2890 PRINT "SET REPLICATE COUNTER TO ";R1
2892 PRINT "PRESS RETURN WHEN READY ";
2900 GOSUB 5100
2904 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2906 GOTO 1000
2908 LET M2$="KEYBOARDCOMPUTER"
2910 PRINT
2912 PRINT "CHANGE FROM ";M2$[M2*8+1,(M2+1)*8];
2914 ON M2+1 THEN GOTO 2920, 2916
2916 LET M2=0
2918 GOTO 2924
2920 LET M2=1
2922 IF Z9=0 THEN LET M2=0
2924 PRINT " TO ";M2$[M2*8+1,(M2+1)*8];" ACQUISITION."
2926 GOTO 2904
2928 GOTO 2944
2930 PRINT "   T - TERMINAL"
2934 PRINT "   L - LINEPRINTER"
2936 PRINT "   B - BOTH TERMINAL AND LINEPRINTER"
2938 PRINT "   N - NONE"
2944 IF LEN(A$)=1 THEN LET A$=""
2945 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2946 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2947 IF LEN(A$)>0 THEN GOTO 2964
2948 PRINT
2950 PRINT "OUTPUT OPTIONS: ([H]TLBN) ";

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     STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                                   PAGE  7
               PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2960 GOSUB 5100
2964 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2968
2966 GOTO 2930
2968 LET M5=POS("TLBN",A$,1)
2970 IF M5>0 THEN GOTO 2976
2972 PRINT "<7>";
2974 GOTO 2948
2976 LET M5=M5-1
2978 GOTO 2904
2980 LET M1=0
2982 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2984 GOTO 1000
3000 IF M2=0 THEN GOTO 3990
3002 LET V1=-9999
3100 READ FILE[2,16],Z0,Z1,Z2,Z3,Z5,Z6
3110 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
3120 READ FILE[2,18],Z1$,Z2$,Z3$,Z4$,Z5$
3130 LET Z5$=I1$
3140 LET Z4$=S0$[D1[3]*15+1,(D1[3]+1)*15]
3170 IF Z9>0 THEN GOTO 3220
3180 CALL 257,Z0,Z3
3190 CALL 257,Z2,Z3
3200 PRINT "<7>*** START SAMPLER NOW. ***<7>"
3210 GOTO 3224
3220 CALL 257,Z1,Z3
3224 ON ESC THEN GOTO 2980
3230 CALL 7,Z5,Z6,Z7,Z8,V[1]
3234 ON ESC THEN GOSUB 8500
3240 LET Z9=Z9+1
3250 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,P9
3260 FOR I=1 TO Z8 STEP 2
3270   LET T9=0
3280   ON ERR THEN GOTO 3300
3290   LET T9=LOG(V[I]/V[I+1])/2.30259
3300   ON ERR THEN STOP
3310   LET V[(I+1)/2]=T9
3320 NEXT I
3330 LET L0=V[1]
3340 LET H0=V[1]
3350 FOR I=1 TO N2
3360   IF L0<V[I] THEN GOTO 3390
3370   LET L0=V[I]

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         0         0         0         0         0         0         0
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     STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                                   PAGE  8
               PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3380   LET I0=I
3390   IF H0>V[I] THEN GOTO 3420
3400   LET H0=V[I]
3410   LET I9=I
3420 NEXT I
3430 LET A1=0
3440 LET A2=0
3450 LET A3=0
3460 FOR I=1 TO N1
3470   IF V[I]=0 THEN GOTO 3510
3480   LET A2=A2+1
3490   LET A1=A1+V[I]
3510 NEXT I
3515 ON ERR THEN GOTO 3521
3520 LET A1=A1/A2
3521 ON ERR THEN STOP
3522 FOR I=1 TO N1
3524   IF V[I]=0 THEN GOTO 3528
3526   LET A3=A3+(V[I]-A1)^2
3528 NEXT I
3530 LET A3=SQR(A3/(A2-1))
3540 LET K=0
3550 LET N3=N1+1
3560 FOR I=N1+1 TO N0+N1
3570   IF V[I]<A1+5*A3 THEN GOTO 3600
3580   LET K=K+1
3590   IF V[I]<V[I+1] THEN IF V[I+1]<V[I+2] THEN IF V[I+2]<V[I+3] THEN
*       GOTO 3650
3600 NEXT I
3610 IF K>0 THEN GOTO 3660
3620 LET H2=H0
3630 LET I2=I9
3635 PRINT "<7>     LEADING EDGE OF PEAK UNDETECTABLE"
3640 GOTO 3790
3650 LET N3=I
3660 LET N4=N0+N1
3670 FOR I=N0+N1 TO N3 STEP -1
3680   IF V[I-3]>V[I-2] THEN IF V[I-2]>V[I-1] THEN IF V[I-1]>V[I] THEN
*       GOTO 3710
3690 NEXT I
3700 GOTO 3720
3710 LET N4=I+2

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PAGE NUMBER
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   STANDARD     CALIBRATION    INSTRUMENT    AUTOMATION     SYSTEM
6/4/1981                                                      PAGE  9
                  PROGRAM LISTING FOR C000G50304.AS

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
3720 LET H2=L0
3730 FOR I=N3 TO N4
3740   IF V[I]<=H2 THEN GOTO 3770
3750   LET H2=V[I]
3760   LET I2=I
3770 NEXT I
3780 IF V[I2]>A1+5*A3 THEN GOTO 3830
3790 PRINT "PEAK ABSORBANCE WILL BE DETERMINED FROM MAXIMUM SIGNAL";
3800 LET V2=V[I2]/2+V[I2-1]/4+V[I2+1]/4
3810 LET I1=0
3820 GOTO 3880
3830 LET P1=(-3*(V[I2-2]+V[I2+2])+12*(V[I2-1]+V[I2+1])+17*V[I2])/35
3840 LET P2=(2*(V[I2+2]-V[I2-2])+V[I2+1]-V[I2-1])/10
3850 LET P3=(2*(V[I2+2]+V[I2-2])-(V[I2+1]+V[I2-1])-2*V[I2])/14
3860 LET I1=P2/(-2*P3)
3861 IF ABS(I1)>2 THEN PRINT "<7>      UNUSUAL (FLAT OR NOISY) PEAK"
3862 IF ABS(I1)>2 THEN GOTO 3790
3870 LET V2=P1+P2*I1+P3*I1*I1
3880 LET I3=I2+I1
3890 LET V1=V2-A1
3900 OPEN FILE[4,2],F4$
3910 WRITE FILE[4],SYS(2),SYS(1),SYS(3),SYS(11),SYS(12),SYS(13)
3920 WRITE FILE[4],R1$,R2$,R3$,R4$,P$
3930 WRITE FILE[4],Z1$,Z2$,Z3$,Z4$,Z5$
3940 WRITE FILE[4],Z5,Z6,Z7,Z8,N2,N1,H0,L0,1,E1,W1,0,0
3950 WRITE FILE[4],I0,I1,I2,I3,V1,A1,V2,M1,A3,D1[7]+1,D1[3],0,0
3960 MAT WRITE FILE[4],V
3970 CLOSE FILE[4]
3980 PRINT "  MEASURED ABS = ";V1;
3982 IF V1<>-9999 THEN GOTO 4001
3984 PRINT "<7>   DATA ERROR!<7>";
3986 IF M2=1 THEN PRINT "<7>SEQUENCING IS BEING TERMINATED!<7>";
3988 PRINT
3989 GOTO 2980
3990 PRINT "  MEASURED ABS ";
3992 ON ERR THEN GOTO 5000
3993 ON ESC THEN GOTO 2980
3994 INPUT "> ",V1;
3995 ON ESC THEN GOSUB 8500
3996 ON ERR THEN STOP
4000 GOTO 3982
4001 IF K0<>1 THEN GOTO 4020

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
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   STANDARD     CALIBRATION    INSTRUMENT    AUTOMATION     SYSTEM
6/4/1981                                                      PAGE 10
                  PROGRAM LISTING FOR C000G50304.AS

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
4002 IF D1[3]=1 THEN GOTO 4020
4003 IF D1[3]<>7 THEN IF D1[3]<>9 THEN IF V1<X0 THEN GOTO 4006
4004 GOTO 4010
4006 PRINT  TAB(20);"<7>OFF SCALE LOW!"
4008 GOTO 4030
4010 IF V1<=X9 THEN GOTO 4020
4012 PRINT  TAB(20);"<7>OFF SCALE HIGH!"
4014 GOTO 4030
4020 PRINT
4030 IF D1[3]<>9 THEN GOTO 4032
4031 LET B9=V1
4032 IF D1[7]+1<=6 THEN GOTO 4060
4035 PRINT
4040 PRINT "  <7>TOO MANY REPLICATES!<7>"
4050 GOTO 4100
4060 LET D1[7]=D1[7]+1
4062 LET D1[D1[7]+7]=V1
4064 LET D1[6]=0
4066 FOR J=1 TO D1[7]
4068   LET D1[6]=D1[6]+D1[J+7]
4070 NEXT J
4072 LET D1[6]=D1[6]/D1[7]
4080 GOSUB 7200
4100 FOR I=0 TO 3
4110   IF INT(I*I+5E-02)=D1[3] THEN GOTO 4200
4115 NEXT I
4120 IF K0=1 THEN GOTO 4150
4140 GOTO 4200
4150 IF D1[7]=0 THEN GOTO 4200
4152 LET S=V1
4154 GOSUB 8000
4156 LET G1=C1
4170 PRINT "  CALC CONC   = ";G1;
4200 PRINT "  AVE.ABS= ";D1[6];
4220 PRINT "  NO.REPS = ";D1[7]
4230 IF D1[7]=0 THEN GOTO 1000
4235 PRINT  TAB(1);
4240 FOR I=1 TO D1[7]
4250   PRINT I;">";D1[I+7];"  ";
4260 NEXT I
4270 PRINT
4280 LET D=1

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
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    STANDARD     CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                         PAGE 11
                      PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4290 ON D1[3] THEN GOTO 1000, 4320, 4310, 4800, 4340, 4350, 4350
4300 GOTO 1000
4310 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
4315 GOTO 4350
4320 LET D=(D1[4]+D1[5])/D1[4]
4330 GOTO 4350
4340 LET D=(D2[4]+D2[5])/D2[4]
4350 IF K0=1 THEN GOTO 4390
4380 GOTO 1000
4390 LET S=D1[6]
4400 GOSUB 8000
4410 LET G2=C1
4440 PRINT "  CURRENT CONC      = ";G2;"(";M0$[(J0-1)*4+1,J0*4];")"
4445 IF D=1 THEN GOTO 4460
4450 PRINT "  DIL FACTOR        = ";D
4460 LET G3=G2*D
4480 PRINT "     RPT CONC (";I1$[12,14];")    = ";G3
4490 ON D1[3] THEN GOTO 1000, 1000, 4530, 4800, 4620, 4710, 4760
4495 GOTO 1000
4530 IF D2[7]=0 THEN GOTO 1000
4540 LET S=D2[6]
4550 GOSUB 8000
4560 LET G4=C1*(D2[4]+D2[5])/D2[4]
4562 LET M=D1[4]*D1[5]
4564 IF D1[4]=0 THEN LET M=D1[5]
4566 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
4570 PRINT "     RPT CONC (";I2$[12,14];")    = ";G4
4580 PRINT "     RPT SPIKE (LSA)  = ";G5
4582 IF G5=0 THEN GOTO 4619
4584 LET Q=(G3-G4)*100/G5
4586 PRINT "     % RECOVERY        = ";Q;"%"
4587 PRINT "     QC MESSAGE        > ";
4588 FOR J=1 TO 5
4590   IF D1[3]<>3 THEN GOTO 4594
4592   IF Q>D2[13+J] THEN GOTO 4600
4593   GOTO 4596
4594   IF Q>D1[13+J] THEN GOTO 4600
4596 NEXT J
4598 LET J=6
4600 ON J THEN GOTO 4602, 4606, 4610, 4610, 4614, 4618
4602 PRINT "<7><7><7>OUT HIGH!<7><7><7>"
4604 GOTO 4619

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         0         0         0         0         0         0         0
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    STANDARD     CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                         PAGE 12
                      PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4606 PRINT "<7><7>WARN HIGH!<7><7>"
4608 GOTO 4619
4610 PRINT "QC OK"
4612 GOTO 4619
4614 PRINT "<7><7>WARN LOW!<7><7>"
4616 GOTO 4619
4618 PRINT "<7><7><7>OUT LOW!<7><7><7>"
4619 GOTO 1000
4620 IF D2[7]=0 THEN GOTO 1000
4630 LET S=D2[6]
4640 GOSUB 8000
4650 LET G4=C1*D
4660 PRINT "     RPT CONC (";I2$[12,14];")    = ";G4
4665 LET X=(G3+G4)/2
4670 PRINT "     XBAR (AVE)        = ";X
4675 LET R9=ABS(G3-G4)
4680 PRINT "     R (CRIT DIFF)     = ";R9
4682 PRINT "     QC MESSAGE        > ";
4684 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 4690
4686 PRINT "QC OK!"
4688 GOTO 4700
4690 PRINT "<7><7><7>OUT!<7><7><7>"
4700 GOTO 1000
4710 PRINT "     THEOR CONC (LCT) = ";D1[5]
4720 IF D1[5]=0 THEN GOTO 4750
4725 LET Q=100*G3/D1[5]
4730 PRINT "     % RECOVERY        = ";Q;"%"
4740 GOTO 4587
4750 GOTO 1000
4760 LET Q=G3
4770 GOTO 4587
4800 IF D2[7]=0 THEN GOTO 1000
4802 LET X=V1
4810 PRINT "     ABS OF CHK STD   = ";X
4820 PRINT "     ABS OF CAL STD   = ";D2[6]
4825 IF D2[6]=0 THEN GOTO 4850
4827 LET Q=100*X/D2[6]
4830 PRINT "     % RECOVERY        = ";Q;"%"
4840 GOTO 4587
4850 GOTO 1000
5000 PRINT "<7> ";
5010 RETRY

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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```
  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
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                  PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
5100 ON ERR THEN GOTO 5000
5110 ON ESC THEN GOTO 1000
5120 INPUT "> ",A$;
5130 ON ESC THEN GOSUB 8500
5140 ON ERR THEN STOP
5150 PRINT
5160 RETURN
6980 REM [  READ/WRITE (.DF) SUBROUTINES   ]
6990 REM ####################################
7000 MAT READ FILE[1,W1],D1
7010 READ FILE[0,W1],I1$
7020 RETURN
7100 MAT READ FILE[1,W2],D2
7110 READ FILE[0,W2],I2$
7120 RETURN
7200 MAT WRITE FILE[1,W1],D1
7210 WRITE FILE[0,W1],I1$
7220 RETURN
7300 MAT WRITE FILE[1,W2],D2
7310 WRITE FILE[0,W2],I2$
7320 RETURN
8000 LET J0=M0+1
8005 IF J0=5 THEN GOTO 8090
8010 READ FILE[2,4+J0],N,D0,P[1],P[2],P[3],P[4],P[5],P[6]
8020 IF P[5]=0 THEN GOTO 8070
8030 LET J0=J0-1
8040 IF J0>=1 THEN GOTO 8010
8050 LET C1=0
8060 RETURN
8070 LET C1=P[1]+S*(P[2]+S*(P[3]+S*P[4]))
8080 GOTO 8060
8090 READ FILE[2,5],N
8092 IF N<=1 THEN GOTO 8140
8095 FOR I=1 TO N-1
8100   READ FILE[2,19+I],R7,C7
8110   READ FILE[2,20+I],R8,C8
8120   IF S>=R7 THEN IF S<R8 THEN GOTO 8400
8130 NEXT I
8140 LET J0=1
8150 GOTO 8010
8400 LET C1=C7+((S-R7)*(C8-C7))/(R8-R7)
8410 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE 14
                  PROGRAM LISTING FOR C000G50304.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
8500 NOESC
8510 READ FILE[2,15],M0,M1,R1,M2,M5,E5
8520 LET E5=E5+1
8525 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
8540 ESC
8550 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                          PAGE 15
                    SYMBOL TABLE FOR C000G50304.AS

SYMBOL    REFERENCES
------    --------------------------------------------------------------
 1000    2092  2210  2848  2868  2906  2984  4230  4290  4300  4380
         4490  4495  4530  4619  4620  4700  4750  4800  4850  5110
 1009    1002
 1060    1030
 1070    1010
 1110    1012  1060
 1130    1050  1100
 2000    1009
 2012    1140  2009
 2020    2116
 2110    2014
 2120    2116
 2190    2002  2117  2120  2130  2160  2544  2550  2554
 2220    2170
 2295    2291
 2300    2290
 2350    2295
 2360    2293  2298  2330
 2380    2116
 2500    2116
 2504    2116
 2508    2116
 2512    2116
 2518    2540
 2534    2516
 2542    2534
 2548    2534
 2554    2382  2502  2506  2510  2564
 2560    2116
 2600    2116
 2602    2634
 2608    2600
 2614    2646
 2632    2612
 2638    2632
 2660    2638
 2662    2694
 2672    2660
 2676    2702
 2692    2675
 2696    2692
 2700    2740
 2704    2698
 2730    2750
 2750    2710
```

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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                          PAGE 16
                    SYMBOL TABLE FOR C000G50304.AS

SYMBOL    REFERENCES
------    --------------------------------------------------------------
 2840    2116  2862
 2864    2858  2882
 2884    2878
 2904    2706  2720  2760  2886  2926  2978
 2908    2638
 2916    2914
 2920    2914
 2924    2918
 2928    2638
 2930    2966
 2944    2928
 2948    2974
 2950    2546
 2964    2947
 2968    2964
 2976    2970
 2980    3224  3989  3993
 3000    2360
 3220    3170
 3224    3210
 3300    3280
 3390    3360
 3420    3390
 3510    3470
 3521    3515
 3528    3524
 3600    3570
 3650    3590
 3660    3610
 3710    3680
 3720    3700
 3770    3740
 3790    3640  3862
 3830    3780
 3880    3820
 3982    4000
 3990    3000
 4000    2552
 4001    3982
 4006    4003
 4010    4004
 4020    4001  4002  4010
 4030    4008  4014
 4032    4030
 4060    4032
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      STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
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                        SYMBOL TABLE FOR C000G50304.AS

SYMBOL    REFERENCES
------   ---------------------------------------------------------------------
 4100    4050
 4150    4120
 4200    4110  4140  4150
 4310    4290
 4320    4290
 4340    4290
 4350    4290  4315  4330
 4390    4350
 4460    4445
 4530    4490
 4587    4740  4770  4840
 4594    4590
 4596    4593
 4600    4592  4594
 4602    4600
 4606    4600
 4610    4600
 4614    4600
 4618    4600
 4619    4582  4604  4608  4612  4616
 4620    4490
 4690    4684
 4700    4688
 4710    4490
 4750    4720
 4760    4490
 4800    4290  4490
 4850    4825
 5000    2846  2866  3992  5100
 5100    2530  2620  2680  2900  2960
 7000    2225
 7100    2300
 7200    4080
 8000    4154  4400  4550  4640
 8010    8040  8150
 8060    8080
 8070    8020
 8090    8005
 8140    8092
 8400    8120
 8500    0009  1001  2192  2852  2872  3234  3995  5130
 A$      2512  2514  2516  2534  2608  2610  2612  2632  2638  2672
         2673  2674  2675  2692  2696  2944  2945  2946  2947  2964
         2968  5120
 A1      3430  3490  3520  3526  3570  3780  3890  3950
```

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      STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                              PAGE 18
                        SYMBOL TABLE FOR C000G50304.AS

SYMBOL    REFERENCES
------   ---------------------------------------------------------------------
 A2      3440  3480  3520  3530
 A3      3450  3526  3530  3570  3780  3950
 A7$     0062
 A8$     0064
 B0      0110
 B9      0088  4031
 C$      0120  1040  1070  1120  2004  2009  2012  2014  2110  2120
         2125  2130  2150  2160  2514  2610  2674  2884  2946
 C0      2110  2116
 C0$     0030  2110
 C1      4156  4410  4560  4566  4650  8050  8070  8400
 C7      8100  8400
 C8      8110  8400
 D       4280  4310  4320  4340  4445  4450  4460  4650
 D0      8010
 D0$     0024  0100  0104
 D1      7000  7200
 D1[     0022  2270  2280  3140  3950  4002  4003  4030  4032  4060
         4062  4064  4066  4068  4072  4110  4150  4200  4220  4230
         4240  4250  4290  4310  4320  4390  4490  4562  4564  4566
         4590  4594  4710  4720  4725
 D2      7100  7300
 D2[     0022  2310  4310  4340  4530  4540  4560  4566  4592  4620
         4630  4684  4800  4820  4825  4827
 E1      3940
 E5      1000  1002  1004  1006  1130  2904  2982  8510  8520  8525
 F4$     0105  3900
 F7$     0100  0104
 FL#0    7010  7110  7210  7310
 FL#1    7000  7100  7200  7300
 FL#2    0100  0104  0110  0120  0130  0140  1000  1006  1130  2012
         2884  2904  2982  3100  3110  3120  3250  8010  8090  8100
         8110  8510  8525
 FL#4    3900  3910  3920  3930  3940  3950  3960  3970
 G1      4156  4170
 G2      4410  4440  4460
 G3      4460  4480  4584  4665  4675  4725  4760
 G4      4560  4570  4584  4650  4660  4665  4675
 G5      4566  4580  4582  4584
 H0      3340  3390  3400  3620  3940
 H2      3620  3720  3740  3750
 I       2125  2130  2140  3260  3290  3310  3320  3350  3360  3370
         3380  3390  3400  3410  3420  3460  3470  3490  3510  3522
         3524  3526  3528  3560  3570  3590  3600  3650  3670  3680
         3690  3710  3730  3740  3750  3760  3770  4100  4110  4115
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     STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                              PAGE 19
                        SYMBOL TABLE FOR C000G50304.AS

SYMBOL     REFERENCES
------     --------------------------------------------------------------
           4240  4250  4260  8095  8100  8110  8130
  I0       3380  3950
  I1       3810  3860  3861  3862  3870  3880  3950
  I1$      0020  2270  3130  4480  7010  7210
  I2       0066  3630  3760  3780  3800  3830  3840  3850  3880  3950
  I2$      0020  4570  4660  7110  7310
  I3       3880  3950
  I9       3410  3630
  J        4066  4068  4070  4588  4592  4594  4596  4598  4600
  J0       4440  8000  8005  8010  8030  8040  8140
  K        3540  3580  3610
  K0       0086  0120  2012  2706  2884  4001  4120  4350
  L0       3330  3360  3370  3720  3940
  M        4562  4564  4566
  M0       0080  1000  1006  1130  2696  2698  2704  2710  2720  2904
           2982  8000  8510  8525
  M0$      0020  0028  4440
  M1       0082  1000  1003  1006  1009  1080  1130  2840  2904  2980
           2982  3950  8510  8525
  M2       0084  1000  1006  1130  2886  2904  2912  2914  2916  2920
           2922  2924  2982  3000  3986  8510  8525
  M2$      0024  2908  2912  2924
  M5       1000  1006  1130  2904  2968  2970  2976  2982  8510  8525
  N        8010  8090  8092  8095
  N0       0140  3110  3250  3560  3660  3670
  N1       0140  3110  3250  3460  3522  3550  3560  3660  3670  3940
  N2       0140  3110  3250  3350  3940
  N3       3550  3650  3670  3730
  N4       3660  3710  3730
  N5       0120  2012  2884
  P$       0100  0101  0102  0103  0104  0105  0106  0107  0108  0109
           2380  2542  2548  2560  3920
  P0$      0100  0101  0104
  P1       3830  3870
  P1$      0100  0102  0104
  P2       3840  3860  3870
  P2$      0100  0103  0104  2380  2500  2504  2508  2542  2546  2548
           2552  2558  2560
  P3       3850  3860  3870
  P5$      0106  2500
  P6$      0107  2504
  P7$      0108  2508
  P8$      0109
  P9       0140  3110  3250
  P[       0022  8010  8020  8070
```

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     STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
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                        SYMBOL TABLE FOR C000G50304.AS

SYMBOL     REFERENCES
------     --------------------------------------------------------------
  Q        4584  4586  4592  4594  4725  4730  4760  4827  4830
  R        0075  0120  1012  1015  1110  2012  2842  2884
  R0       0110
  R0$      0100  0104
  R1       0068  1000  1006  1012  1095  1130  2850  2858  2890  2904
           2982  8510  8525
  R1$      0012  0130  3920
  R2$      0012  0130  3920
  R3$      0012  0130  3920
  R4$      0012  0130  3920
  R7       8100  8120  8400
  R8       8110  8120  8400
  R9       4675  4680  4684
  S        4152  4390  4540  4630  8070  8120  8400
  S0       0110  2720  2750
  S0$      0020  0040  0050  0060  2270  2310  3140
  S1$      0020
  S9       0090  0110  1030
  T0       0110
  T9       3270  3290  3310
  U0       0110
  U1$      0120  2012  2884
  U2$      0120  2012  2884
  V        3960
  V1       3002  3890  3950  3980  3982  3994  4003  4010  4031  4062
           4152  4802
  V2       3800  3870  3890  3950
  V[       0022  3230  3290  3310  3330  3340  3360  3370  3390  3400
           3470  3490  3524  3526  3570  3590  3680  3740  3750  3780
           3800  3830  3840  3850
  W        0070  0120  1010  1020  1030  1060  1090  1120  2012  2870
           2878  2884  2888
  W0       0092  0110  1010  1060  2170  2878
  W1       2150  2160  2170  2260  2290  3940  7000  7010  7200  7210
  W2       2280  2290  2291  2295  2320  7100  7110  7300  7310
  X        4665  4670  4684  4802  4810  4827
  X0       0120  2012  2884  4003
  X9       0120  2012  2884  4010
  Y0       0110
  Y9       0110
  Z0       3100  3180
  Z1       3100  3220
  Z1$      3120  3930
  Z2       3100  3190
  Z2$      3120  3930
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```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE 21
                     SYMBOL TABLE FOR C000G50304.AS

SYMBOL    REFERENCES
------  ----------------------------------------------------------
 Z3     3100  3180  3190  3220
 Z3$    3120  3930
 Z4$    0024  3120  3140  3930
 Z5     3100  3230  3940
 Z5$    0024  3120  3130  3930
 Z6     3100  3230  3940
 Z7     0140  3110  3230  3250  3940
 Z8     0140  3110  3230  3250  3260  3940
 Z9     0140  2922  3110  3170  3240  3250
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TABLE 10. SYMBOL DEFINITIONS FOR ISCN.04 FOR VARIAN AA-5/AA-6 FLAME ADAPTATION

A1	the mean absorbance
A2	the number of signal readings used to compute A1 and A3
A3	the standard deviation of the mean absorbance (A1)
A$	a general purpose answer string
B9	the absorbance of the last measured instrument blank
C$	the current IRCL command string
C0	the command string router variable
C0$	the master IRCL option string
C1	the computed concentration of a sample
C7	an interpolation variable - low concentration
C8	an interpolation variable - high concentration
D	the dilution factor for a sample
D0	the degree of a regression equation
D0$	the date code of the Run File
D1()	the data array for the current sample
D2()	the data array for a previous (primary) QC member
E5	the ESCape counter
F4$	the name of the peak plot file
F7$	the name of the Run File
G1	the calculated (average) concentration
G2	the current concentration (C1)
G3	the calculated concentration of the primary QC member (LD1, LS0, LDX)
G4	the reported concentration
G5	the reported spike value (LSA)
H0	the highest absorbance signal
I	a general purpose counter
I0	the array position of the lowest absorbance signal
I1$	the identifier string for the current sample
I2$	the identifier string for a previous (primary) QC member
I0	the array position of the highest absorbance signal
J	a counter
J0	the computation mode flag
K	a counter and general purpose variable
K0	the calibration flag
L0	the lowest absorbance signal
M	the mass of the spike
M0	the computational mode flag
M0$	the computational mode super-string
M1	the sequencing mode flag
M2	the data acquisition mode flag
M2$	the data acquisition mode super-string
M5	the output mode flag
N	an interpolation variable - the number of standards
N2	the total number of data points
P$	the program and file prefix
P0$	the name of the program last executed

TABLE 10. (Contd.)

P1$	the name of the current program (.04)
P2$	the dummy name of the next executable program
P5$	the name of the calibration program
P6$	the name of the interim report generator program
P7$	the name of the Final Report generator program
P()	the coefficient array for regression equations
Q	the QC assessment variable
R	the replicate counter
R0$	the generic PARMETH code in a Run File
R1	the number of replicate measurements made on a sample
R1$	the analyst's initial string
R2$	the analyte string
R3$	the concentration unit string
R4$	the instrument name string
R7	an interpolation variable - low absorbance
R8	an interpolation variable - high absorbance
R9	the difference between duplicates
S	the absorbance of a sample
S0	the number of calibration standards in a wheel pattern
S0$	the sample descriptor super-string
S9	the position at which calibration is to occur
T0	the number of timing set standards in a wheel position
T9	a transmittance-to-absorbance conversion variable
U0	the number of unknowns in a wheel pattern
U1$	the format string for absorbance values
U2$	the format string for concentration values
V1	the baseline-corrected peak absorbance
V2	the determined peak absorbance
V()	the raw peak data array
W	the wheel position counter
W0	the number of samples in a wheel pattern
W1	the current wheel position
W2	the wheel position of a previous (primary) QC member
X	a QC assessment variable
X0	the lowest absorbance for calibration standards
X9	the highest absorbance for calibration standards
Z1$	the double/single channel indicator
Z2	the sample aspiration-to-atomization lag time (in seconds)
Z3	the channel number of the automatic sampler
Z4	the CALL 21/22 function/position number
Z4$	the sample type descriptor
Z5	the channel for CALL 7 without "sense"
Z5$	the sample identifier
Z6	the sample aspiration-to-atomization lag time (in clock ticks)
Z7	the sampling frequency (in clock ticks)
Z8	the quantity of available points in the CALL 7
Z9	the injection/measurement counter

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     STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                        PAGE  1
                    PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0001 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0002 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0003 REM *   PROGRAM: ISCN.04 - RUN CONTROL PROGRAM; INCLUDES IRCL,  *
0004 REM *            MEAS, MODE CHNG; CHAINS 00,05,06,07,08,09,&12  *
0005 REM *            FOR AA6, ANNAPOLIS-REGION 3, FLAME, FSC2       *
0006 REM *   BY D.RYAN (UCCC), MAY 29, 1979                          *
0007 REM *   MOST RECENT REVISION: MAY 5, 1981                       *
0008 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0009 ON ESC THEN GOSUB 8500
0010 ESC
0012 DIM R1$[4],R2$[2],R3$[8],R4$[16]
0020 DIM S0$[150],M0$[20],I1$[15],I2$[15],S1$[80]
0022 DIM D1[25],D2[25],P[6],V[300]
0024 DIM D0$[20],Z4$[20],Z5$[20],M2$[20]
0028 LET M0$="FZERLINRQUADCUBCINTR"
0030 LET C0$="HMCRE3AUP1"
0040 LET S0$="TIMING SET STD  INSTR CAL STD UNKNOWN SAMPLE    SPIKE  0
*     F   "
0050 LET S0$=S0$,"   CHECK  OF    DUPLICATE  OF  LAB CNTRL STD "
0060 LET S0$=S0$," REAGENT BLANK  SURROGATE SPK   INSTR BLANK  "
0062 LET A7$="0"
0064 LET A8$="0"
0066 LET I2=1
0068 LET R1=0
0070 LET W=0
0075 LET R=0
0080 LET M0=1
0082 LET M1=0
0084 LET M2=0
0086 LET K0=0
0088 LET B9=0
0090 LET S9=0
0092 LET W0=0
0100 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0101 LET P0$=P$,".03"
0102 LET P1$=P$,".04"
0103 LET P2$=P$,".XX"
0104 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0105 LET F4$=P$,".PK"
0106 LET P5$=P$,".05"
0107 LET P6$=P$,".06"
0108 LET P7$=P$,".07"

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         0         0         0         0         0         0         0
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     STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                        PAGE  2
                    PROGRAM LISTING FOR A000FAA604.AS

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         0         0         0         0         0         0         0
0109 LET P8$=P$,".08"
0110 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0120 READ FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
0130 READ FILE[2,9],R1$,R2$,R3$,R4$
0140 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,B9
1000 READ FILE[2,15],M0,M1,R1,M2,M5,E5
1001 ON ESC THEN GOSUB 8500
1002 IF E5=0 THEN GOTO 1009
1003 LET M1=0
1004 LET E5=0
1006 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1009 IF M1=0 THEN GOTO 2000
1010 IF W>W0+1 THEN GOTO 1070
1012 IF R+1<=R1 THEN GOTO 1110
1015 LET R=0
1020 LET W=W+1
1030 IF W<>S9 THEN GOTO 1060
1040 LET C$="C"
1050 GOTO 1130
1060 IF W<=W0 THEN GOTO 1110
1070 LET C$="R"
1080 LET M1=0
1090 LET W=0
1095 LET R1=1
1100 GOTO 1130
1110 LET R=R+1
1120 LET C$="M",STR$(W)
1130 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
1140 GOTO 2012
2000 PRINT
2001 PRINT "INSTRUMENT RUN OPTIONS: ([H]MCRE3AUP1) ";
2002 ON ERR THEN GOTO 2190
2003 NOESC
2004 INPUT " > ",C$;
2005 ESC
2006 ON ERR THEN STOP
2007 PRINT
2008 REM******************************
2009 IF C$<>"DPR" THEN GOTO 2012
2010 STOP
2011 REM******************************
2012 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE  3
                  PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2014 IF LEN(C$)>0 THEN GOTO 2110
2020 PRINT "    M[POS]  MEASURE SAMPLE IN POS"
2050 PRINT "    C       CALIBRATE STANDARDS"
2060 PRINT "    R       REPORT STATUS"
2070 PRINT "    E$[POS] EDIT ABS OR DILUTION DATA (S[POS],P,D[POS])"
2080 PRINT "    3       ACCESS FINISH COMMAND LEVEL(3)"
2084 PRINT "    A       START AUTOMATIC RUN-SEQUENCE (WITH POS/REPS)"
2086 PRINT "    U$      USER EDIT OF RUN-MODES (K,D,O)"
2088 PRINT "    P$      PLOT CALIBRATION OR PEAK DATA (C OR P)"
2090 PRINT "    1       EXIT IRCL(2) TO ASCL(1)"
2092 GOTO 1000
2110 LET CO=POS(CO$,C$[1,1],1)
2116 ON CO THEN GOTO 2020, 2120, 2500, 2504, 2380, 2508, 2840, 2600, 2
*    512, 2560
2117 GOTO 2190
2120 IF LEN(C$)<=1 THEN GOTO 2190
2125 FOR I=1 TO LEN(C$[2])
2130   IF C$[I+1,I+1]<"0" THEN IF C$[I+1,I+1]>"9" THEN GOTO 2190
2140 NEXT I
2150 LET W1=VAL(C$[2])
2160 IF STR$(W1)<>C$[2] THEN GOTO 2190
2170 IF INT(W1)=W1 THEN IF W1>=1 THEN IF W1<=W0 THEN GOTO 2220
2190 ON ERR THEN STOP
2192 ON ESC THEN GOTO 8500
2195 PRINT
2200 PRINT "<7>OPTION ERROR<7>"
2210 GOTO 1000
2220 PRINT
2225 GOSUB 7000
2260 PRINT USING "MEAS POS ### ",W1;
2270 PRINT "/";I1$;"/";S0$[D1[3]*15+1,(D1[3]+1)*15];
2280 LET W2=D1[2]
2290 IF W2<W1 THEN IF W2>=1 THEN GOTO 2300
2291 IF W2<>0 THEN GOTO 2295
2292 PRINT
2293 GOTO 2360
2295 IF W2=-1 THEN GOTO 2350
2298 GOTO 2360
2300 GOSUB 7100
2310 PRINT S0$[D2[3]*15+1,(D2[3]+1)*15];
2320 PRINT USING " IN POS ###",W2
2330 GOTO 2360

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE  4
                  PROGRAM LISTING FOR A000FAA604.AS

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         0         0         0         0         0         0         0
2350 PRINT " (HAS QC)"
2360 GOTO 3000
2380 LET P2$=P$,".12"
2382 GOTO 2554
2500 LET P2$=P5$
2502 GOTO 2554
2504 LET P2$=P6$
2506 GOTO 2554
2508 LET P2$=P7$
2510 GOTO 2554
2512 LET A$=""
2514 IF LEN(C$)>1 THEN LET A$=C$[2,2]
2516 IF LEN(A$)>0 THEN GOTO 2534
2518 PRINT
2520 PRINT "CALIBRATION OR PEAK PLOTTING ([C] OR P) ";
2530 GOSUB 5100
2534 ON POS("CP",A$,1) THEN GOTO 2542, 2548
2538 PRINT "<7>";
2540 GOTO 2518
2542 LET P2$=P$,".08"
2544 ON ERR THEN GOTO 2190
2545 NOESC
2546 CHAIN P2$ THEN GOTO 2950
2548 LET P2$=P$,".09"
2550 ON ERR THEN GOTO 2190
2551 NOESC
2552 CHAIN P2$ THEN GOTO 4000
2554 ON ERR THEN GOTO 2190
2556 NOESC
2558 CHAIN P2$
2560 LET P2$=P$,".00"
2562 CLOSE
2564 GOTO 2554
2600 GOTO 2608
2602 PRINT "   K - CHANGE COMPUTATIONAL MODE (ZLQCI)"
2604 PRINT "   D - CHANGE DATA ACQUISITION MODE"
2606 PRINT "   O - CHANGE OUTPUT MODE (TLBN)"
2608 LET A$=""
2610 IF LEN(C$)>1 THEN LET A$=C$[2]
2612 IF LEN(A$)>0 THEN GOTO 2632
2614 PRINT
2618 PRINT "MODE EDIT OPTIONS: ([H]KDO) ";

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE  5
                  PROGRAM LISTING FOR A000FAA604.AS

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         0         0         0         0         0         0         0
2620 GOSUB 5100
2632 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2638
2634 GOTO 2602
2638 ON POS("KDO",A$[1,1],1) THEN GOTO 2660, 2908, 2928
2644 PRINT "<7>";
2646 GOTO 2614
2660 GOTO 2672
2662 PRINT "   Z - FORCED ZERO LINEAR"
2664 PRINT "   L - REGULAR LINEAR"
2666 PRINT "   Q - QUADRATIC"
2668 PRINT "   C - CUBIC"
2670 PRINT "   I - INTERPOLATION"
2672 IF LEN(A$)=1 THEN LET A$=""
2673 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2674 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2675 IF LEN(A$)>0 THEN GOTO 2692
2676 PRINT
2678 PRINT "COMPUTATIONAL MODE: ([H]ZLQCI) ";
2680 GOSUB 5100
2692 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2696
2694 GOTO 2662
2696 LET M0=POS("ZLQCI",A$,1)
2698 IF M0>0 THEN GOTO 2704
2700 PRINT "<7>";
2702 GOTO 2676
2704 LET M0=M0-1
2706 IF K0=0 THEN GOTO 2904
2710 IF M0=4 THEN GOTO 2750
2720 IF M0<S0 THEN GOTO 2904
2730 PRINT "<7>ILLEGAL MODE!<7>";
2740 GOTO 2700
2750 IF S0<2 THEN GOTO 2730
2760 GOTO 2904
2840 LET M1=1
2842 LET R=0
2844 PRINT "<13>NUMBER OF REPLICATES ";
2846 ON ERR THEN GOTO 5000
2848 ON ESC THEN GOTO 1000
2850 INPUT "> ",R1;
2852 ON ESC THEN GOSUB 8500
2854 ON ERR THEN STOP
2856 PRINT

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE  6
                  PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2858 IF R1>0 THEN IF R1<7 THEN IF INT(R1)=R1 THEN GOTO 2864
2860 PRINT "<7>";
2862 GOTO 2840
2864 PRINT "<13>STARTING POSITION ";
2866 ON ERR THEN GOTO 5000
2868 ON ESC THEN GOTO 1000
2870 INPUT "> ",W;
2872 ON ESC THEN GOSUB 8500
2874 ON ERR THEN STOP
2876 PRINT
2878 IF W>=1 THEN IF W<=W0 THEN IF W=INT(W) THEN GOTO 2884
2880 PRINT "<7>";
2882 GOTO 2864
2884 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
2904 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2906 GOTO 1000
2908 LET M2$="KEYBOARDCOMPUTER"
2910 PRINT
2912 PRINT "CHANGE FROM ";M2$[M2*8+1,(M2+1)*8];
2914 ON M2+1 THEN GOTO 2920, 2916
2916 LET M2=0
2918 GOTO 2924
2920 LET M2=1
2922 IF Z9=0 THEN LET M2=0
2924 PRINT " TO ";M2$[M2*8+1,(M2+1)*8];" ACQUISITION."
2926 GOTO 2904
2928 GOTO 2944
2930 PRINT "   T - TERMINAL"
2934 PRINT "   L - LINEPRINTER"
2936 PRINT "   B - BOTH TERMINAL AND LINEPRINTER"
2938 PRINT "   N - NONE"
2944 IF LEN(A$)=1 THEN LET A$=""
2945 IF LEN(A$)>1 THEN LET A$=A$[2,2]
2946 IF LEN(C$)>2 THEN LET A$=C$[3,3]
2947 IF LEN(A$)>0 THEN GOTO 2964
2948 PRINT
2950 PRINT "OUTPUT OPTIONS: ([H]TLBN) ";
2960 GOSUB 5100
2964 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 2968
2966 GOTO 2930
2968 LET M5=POS("TLBN",A$,1)
2970 IF M5>0 THEN GOTO 2976

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE  7
              PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2972 PRINT "<7>";
2974 GOTO 2948
2976 LET M5=M5-1
2978 GOTO 2904
2980 LET M1=0
2982 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2984 GOTO 1000
3000 IF M2=0 THEN GOTO 3990
3002 LET V1=-9999
3100 READ FILE[2,16],Z0,Z1,Z2,Z3,Z5,Z6
3110 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2,B9
3120 READ FILE[2,18],Z1$,Z2$,Z3$,Z4$,Z5$
3130 LET Z5$=I1$
3140 LET Z4$=S0$[D1[3]*15+1,(D1[3]+1)*15]
3180 LET Z4=W1-INT((W1-1)/40)*40
3200 REM --- DATA ACQ/REDUC SUBRT
3224 MAT V=ZER
3228 REM [MOVE ARM AND ASPIRATE]
3236 LET A1=Z4
3244 LET A2=Z6
3252 LET A3=N2
3260 ON ESC THEN GOTO 3772
3268 CALL 22,Z3,A1
3276 REM [WAIT AND COLLECT DATA]
3284 ON ESC THEN GOTO 3308
3292 CALL 7,Z5,A2,Z7,A3,V[1]
3300 REM [RAISE ARM TO STOP ASPIRATION]
3308 LET A1=1
3316 CALL 21,Z3,A1
3324 ON ESC THEN GOSUB 8500
3332 LET Z9=Z9+1
3340 PRINT
3348 FOR I=1 TO Z8
3356    LET T9=0
3364    ON ERR THEN GOTO 3380
3372    LET T9=LOG(14000/V[I])/2.30259
3380    ON ERR THEN STOP
3388    LET V[I]=T9
3396 NEXT I
3404 LET L0=V[1]
3412 LET H0=V[1]
3420 FOR I=1 TO N2

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                   PAGE  8
              PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3428    IF L0<V[I] THEN GOTO 3452
3436    LET L0=V[I]
3444    LET I0=I
3452    IF H0>V[I] THEN GOTO 3476
3460    LET H0=V[I]
3468    LET I9=I
3476 NEXT I
3484 LET A1=0
3492 LET A2=0
3500 LET A3=0
3508 FOR I=1 TO N2
3516    IF V[I]=0 THEN GOTO 3540
3524    LET A2=A2+1
3532    LET A1=A1+V[I]
3540 NEXT I
3548 LET A1=A1/A2
3556 LET V2=A1
3564 FOR I=1 TO N2
3572    IF V[I]=0 THEN GOTO 3588
3580    LET A3=A3+(V[I]-A1)^2
3588 NEXT I
3596 LET A3=SQR(A3/(A2-1))
3604 LET K=0
3612 FOR I=1 TO N2
3620    IF V[I]>A1+3*A3 THEN LET K=K+1
3628    IF V[I]<A1-3*A3 THEN LET K=K+1
3636 NEXT I
3644 LET V2=A1
3652 IF D1[3]=9 THEN LET B9=V2
3660 WRITE FILE[2,17],Z7,Z8,Z9,N0,N1,N2,B9
3668 LET V1=V2-B9
3670 OPEN FILE[4,2],F4$
3700 WRITE FILE[4],SYS(2),SYS(1),SYS(3),SYS(11),SYS(12),SYS(13)
3708 WRITE FILE[4],R1$,R2$,R3$,R4$,P$
3716 WRITE FILE[4],Z1$,Z2$,Z3$,Z4$,Z5$
3724 WRITE FILE[4],Z5,Z6,Z7,Z8,N2,N1,H0,L0,E0,E1,0,0,0
3732 WRITE FILE[4],I0,I1,I2,I3,V1,A1,V2,M1,A3,0,0,0,0
3740 MAT WRITE FILE[4],V
3748 CLOSE FILE[4]
3756 GOTO 3980
3764 REM [ESCAPE DURING ASPIRATION]
3772 NOESC

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    STANDARD     CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE  9
                    PROGRAM LISTING FOR A000FAA604.AS

12345678911234567892123456789312345678941234567895123456789612345678 97
         0          0          0          0          0          0          0
3774 PRINT "<7>"
3780 LET A2=1
3788 CALL 21,Z3,A2
3793 ON ESC THEN GOTO 2980
3796 ESC
3804 PRINT
3812 PRINT "SET SAMPLER ARM AT POSITION #1 AND";
3820 ON ERR THEN GOTO 3820
3828 INPUT " PRESS RETURN  > ",A$
3836 ON ERR THEN STOP
3844 LET A1=0
3852 LET A2=1
3860 CALL 22,Z3,A1
3868 CALL 21,Z3,A2
3876 GOTO 2980
3980 PRINT "  MEASURED ABS = ";V1;
3982 IF V1<>-9999 THEN GOTO 4001
3984 PRINT "<7>   DATA ERROR!<7>";
3986 IF M2=1 THEN PRINT "<7>SEQUENCING IS BEING TERMINATED!<7>";
3988 PRINT
3989 GOTO 2980
3990 PRINT "  MEASURED ABS ";
3992 ON ERR THEN GOTO 5000
3993 ON ESC THEN GOTO 2980
3994 INPUT "> ",V1;
3995 ON ESC THEN GOSUB 8500
3996 ON ERR THEN STOP
4000 GOTO 3982
4001 IF K0<>1 THEN GOTO 4020
4002 IF D1[3]=1 THEN GOTO 4020
4003 IF D1[3]<>7 THEN IF D1[3]<>9 THEN IF V1<X0 THEN GOTO 4006
4004 GOTO 4010
4006 PRINT  TAB(20);"<7>OFF SCALE LOW!"
4008 GOTO 4030
4010 IF V1<=X9 THEN GOTO 4020
4012 PRINT  TAB(20);"<7>OFF SCALE HIGH!"
4014 GOTO 4030
4020 PRINT
4030 IF D1[7]+1<=6 THEN GOTO 4060
4035 PRINT
4040 PRINT "  <7>TOO MANY REPLICATES!<7>"
4050 GOTO 4100

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         0          0          0          0          0          0          0
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    STANDARD     CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE 10
                    PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
4060 LET D1[7]=D1[7]+1
4062 LET D1[D1[7]+7]=V1
4064 LET D1[6]=0
4066 FOR J=1 TO D1[7]
4068   LET D1[6]=D1[6]+D1[J+7]
4070 NEXT J
4072 LET D1[6]=D1[6]/D1[7]
4080 GOSUB 7200
4100 FOR I=0 TO 3
4110   IF INT(I*I+5E-02)=D1[3] THEN GOTO 4200
4115 NEXT I
4120 IF K0=1 THEN GOTO 4150
4140 GOTO 4200
4150 IF D1[7]=0 THEN GOTO 4200
4152 LET S=V1
4154 GOSUB 8000
4156 LET G1=C1
4170 PRINT "  CALC CONC   = ";G1;
4200 PRINT "  AVE.ABS= ";D1[6];
4220 PRINT "  NO.REPS = ";D1[7]
4230 IF D1[7]=0 THEN GOTO 1000
4235 PRINT  TAB(1);
4240 FOR I=1 TO D1[7]
4250   PRINT I;">";D1[I+7];"  ";
4260 NEXT I
4270 PRINT
4280 LET D=1
4290 ON D1[3] THEN GOTO 1000, 4320, 4310, 4800, 4340, 4350, 4350
4300 GOTO 1000
4310 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
4315 GOTO 4350
4320 LET D=(D1[4]+D1[5])/D1[4]
4330 GOTO 4350
4340 LET D=(D2[4]+D2[5])/D2[4]
4350 IF K0=1 THEN GOTO 4390
4380 GOTO 1000
4390 LET S=D1[6]
4400 GOSUB 8000
4410 LET G2=C1
4440 PRINT "  CURRENT CONC      = ";G2;"(";M0$[(J0-1)*4+1,J0*4];")"
4445 IF D=1 THEN GOTO 4460
4450 PRINT "  DIL FACTOR        = ";D

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    STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                        PAGE 11
                    PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4460 LET G3=G2*D
4480 PRINT "     RPT CONC (";I1$[12,14];")    = ";G3
4490 ON D1[3] THEN GOTO 1000, 1000, 4530, 4800, 4620, 4710, 4760
4495 GOTO 1000
4530 IF D2[7]=0 THEN GOTO 1000
4540 LET S=D2[6]
4550 GOSUB 8000
4560 LET G4=C1*(D2[4]+D2[5])/D2[4]
4562 LET M=D1[4]*D1[5]
4564 IF D1[4]=0 THEN LET M=D1[5]
4566 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
4570 PRINT "     RPT CONC (";I2$[12,14];")    = ";G4
4580 PRINT "     RPT SPIKE (LSA)  = ";G5
4582 IF G5=0 THEN GOTO 4619
4584 LET Q=(G3-G4)*100/G5
4586 PRINT "     % RECOVERY        = ";Q;"%"
4587 PRINT "     QC MESSAGE        > ";
4588 FOR J=1 TO 5
4590   IF D1[3]<>3 THEN GOTO 4594
4592   IF Q>D2[13+J] THEN GOTO 4600
4593   GOTO 4596
4594   IF Q>D1[13+J] THEN GOTO 4600
4596 NEXT J
4598 LET J=6
4600 ON J THEN GOTO 4602, 4606, 4610, 4610, 4614, 4618
4602 PRINT "<7><7><7>OUT HIGH!<7><7><7>"
4604 GOTO 4619
4606 PRINT "<7><7>WARN HIGH!<7><7>"
4608 GOTO 4619
4610 PRINT "QC OK"
4612 GOTO 4619
4614 PRINT "<7><7>WARN LOW!<7><7>"
4616 GOTO 4619
4618 PRINT "<7><7><7>OUT LOW!<7><7><7>"
4619 GOTO 1000
4620 IF D2[7]=0 THEN GOTO 1000
4630 LET S=D2[6]
4640 GOSUB 8000
4650 LET G4=C1*D
4660 PRINT "     RPT CONC (";I2$[12,14];")    = ";G4
4665 LET X=(G3+G4)/2
4670 PRINT "     XBAR (AVE)        = ";X

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         0         0         0         0         0         0         0
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    STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
6/4/1981                                                        PAGE 12
                    PROGRAM LISTING FOR A000FAA604.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4675 LET R9=ABS(G3-G4)
4680 PRINT "     R (CRIT DIFF)     = ";R9
4682 PRINT "     QC MESSAGE        > ";
4684 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 4690
4686 PRINT "QC OK!"
4688 GOTO 4700
4690 PRINT "<7><7><7>OUT!<7><7><7>"
4700 GOTO 1000
4710 PRINT "     THEOR CONC (LCT) = ";D1[5]
4720 IF D1[5]=0 THEN GOTO 4750
4725 LET Q=100*G3/D1[5]
4730 PRINT "     % RECOVERY        = ";Q;"%"
4740 GOTO 4587
4750 GOTO 1000
4760 LET Q=G3
4770 GOTO 4587
4800 IF D2[7]=0 THEN GOTO 1000
4802 LET X=V1
4810 PRINT "     ABS OF CHK STD    = ";X
4820 PRINT "     ABS OF CAL STD    = ";D2[6]
4825 IF D2[6]=0 THEN GOTO 4850
4827 LET Q=100*X/D2[6]
4830 PRINT "     % RECOVERY        = ";Q;"%"
4840 GOTO 4587
4850 GOTO 1000
5000 PRINT "<7> ";
5010 RETRY
5100 ON ERR THEN GOTO 5000
5110 ON ESC THEN GOTO 1000
5120 INPUT "> ",A$;
5130 ON ESC THEN GOSUB 8500
5140 ON ERR THEN STOP
5150 PRINT
5160 RETURN
6980 REM [  READ/WRITE (.DF) SUBROUTINES   ]
6990 REM ********************************
7000 MAT READ FILE[1,W1],D1
7010 READ FILE[0,W1],I1$
7020 RETURN
7100 MAT READ FILE[1,W2],D2
7110 READ FILE[0,W2],I2$
7120 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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```
   STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                                PAGE 13
              PROGRAM LISTING FOR A000FAA604.AS

12345678911234567892123456789312345678941234567895123456789612345678977
         0         0         0         0         0         0         0
7200 MAT WRITE FILE[1,W1],D1
7210 WRITE FILE[0,W1],I1$
7220 RETURN
7300 MAT WRITE FILE[1,W2],D2
7310 WRITE FILE[0,W2],I2$
7320 RETURN
8000 LET J0=M0+1
8005 IF J0=5 THEN GOTO 8090
8010 READ FILE[2,4+J0],N,D0,P[1],P[2],P[3],P[4],P[5],P[6]
8020 IF P[5]=0 THEN GOTO 8070
8030 LET J0=J0-1
8040 IF J0>=1 THEN GOTO 8010
8050 LET C1=0
8060 RETURN
8070 LET C1=P[1]+S*(P[2]+S*(P[3]+S*P[4]))
8080 GOTO 8060
8090 READ FILE[2,5],N
8092 IF N<=1 THEN GOTO 8140
8095 FOR I=1 TO N-1
8100   READ FILE[2,19+I],R7,C7
8110   READ FILE[2,20+I],R8,C8
8120   IF S>=R7 THEN IF S<R8 THEN GOTO 8400
8130 NEXT I
8140 LET J0=1
8150 GOTO 8010
8400 LET C1=C7+((S-R7)*(C8-C7))/(R8-R7)
8410 RETURN
8500 NOESC
8510 READ FILE[2,15],M0,M1,R1,M2,M5,E5
8520 LET E5=E5+1
8525 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
8540 ESC
8550 RETURN











12345678911234567892123456789312345678941234567895123456789612345678977
         0         0         0         0         0         0         0
```

```
   STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
6/4/1981                                                PAGE 14
              SYMBOL TABLE FOR A000FAA604.AS

SYMBOL   REFERENCES
------   ----------------------------------------------------------
 1000    2092  2210  2848  2868  2906  2984  4230  4290  4300  4380
         4490  4495  4530  4619  4620  4700  4750  4800  4850  5110
 1009    1002
 1060    1030
 1070    1010
 1110    1012  1060
 1130    1050  1100
 2000    1009
 2012    1140  2009
 2020    2116
 2110    2014
 2120    2116
 2190    2002  2117  2120  2130  2160  2544  2550  2554
 2220    2170
 2295    2291
 2300    2290
 2350    2295
 2360    2293  2298  2330
 2380    2116
 2500    2116
 2504    2116
 2508    2116
 2512    2116
 2518    2540
 2534    2516
 2542    2534
 2548    2534
 2554    2382  2502  2506  2510  2564
 2560    2116
 2600    2116
 2602    2634
 2608    2600
 2614    2646
 2632    2612
 2638    2632
 2660    2638
 2662    2694
 2672    2660
 2676    2702
 2692    2675
 2696    2692
 2700    2740
 2704    2698
 2730    2750
 2750    2710
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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE 15
                     SYMBOL TABLE FOR A000FAA604.AS

SYMBOL    REFERENCES
------    ------------------------------------------------------------
 2840  2116  2862
 2864  2858  2882
 2884  2878
 2904  2706  2720  2760  2926  2978
 2908  2638
 2916  2914
 2920  2914
 2924  2918
 2928  2638
 2930  2966
 2944  2928
 2948  2974
 2950  2546
 2964  2947
 2968  2964
 2976  2970
 2980  3793  3876  3989  3993
 3000  2360
 3308  3284
 3380  3364
 3452  3428
 3476  3452
 3540  3516
 3588  3572

 3772  3260
 3820  3820
 3980  3756
 3982  4000
 3990  3000
 4000  2552
 4001  3982
 4006  4003
 4010  4004
 4020  4001  4002  4010
 4030  4008  4014
 4060  4030
 4100  4050
 4150  4120
 4200  4110  4140  4150
 4310  4290
 4320  4290
 4340  4290
 4350  4290  4315  4330
 4390  4350
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                    PAGE 16
                     SYMBOL TABLE FOR A000FAA604.AS

SYMBOL    REFERENCES
------    ------------------------------------------------------------
 4460  4445
 4530  4490
 4587  4740  4770  4840
 4594  4590
 4596  4593
 4600  4592  4594
 4602  4600
 4606  4600
 4610  4600
 4614  4600
 4618  4600
 4619  4582  4604  4608  4612  4616
 4620  4490
 4690  4684
 4700  4688
 4710  4490
 4750  4720
 4760  4490
 4800  4290  4490
 4850  4825
 5000  2846  2866  3992  5100
 5100  2530  2620  2680  2960
 7000  2225
 7100  2300
 7200  4080
 8000  4154  4400  4550  4640
 8010  8040  8150
 8060  8080
 8070  8020
 8090  8005
 8140  8092
 8400  8120
 8500  0009  1001  2192  2852  2872  3324  3995  5130
 A$    2512  2514  2516  2534  2608  2610  2612  2632  2638  2672
       2673  2674  2675  2692  2696  2944  2945  2946  2947  2964
       2968  3828  5120
 A1    3236  3268  3308  3316  3484  3532  3548  3556  3580  3620
       3628  3644  3732  3844  3860
 A2    3244  3292  3492  3524  3548  3596  3780  3788  3852  3868
 A3    3252  3292  3500  3580  3596  3620  3628  3732
 A7$   0062
 A8$   0064
 B0    0110
 B9    0088  0140  3110  3660  3668
 C$    0120  1040  1070  1120  2004  2009  2012  2014  2110  2120
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       STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE 17
                   SYMBOL TABLE FOR A000FAA604.AS

SYMBOL   REFERENCES
------   -------------------------------------------------------------
         2125  2130  2150  2160  2514  2610  2674  2884  2946
C0       2110  2116
C0$      0030  2110
C1       4156  4410  4560  4566  4650  8050  8070  8400
C7       8100  8400
C8       8110  8400
D        4280  4310  4320  4340  4445  4450  4460  4650
D0       8010
D0$      0024  0100  0104
D1       7000  7200
D1[      0022  2270  2280  3140  3652  4002  4003  4030  4060  4062
         4064  4066  4068  4072  4110  4150  4200  4220  4230  4240
         4250  4290  4310  4320  4390  4490  4562  4564  4566  4590
         4594  4710  4720  4725
D2       7100  7300
D2[      0022  2310  4310  4340  4530  4540  4560  4566  4592  4620
         4630  4684  4800  4820  4825  4827
E0       3724
E1       3724
E5       1000  1002  1004  1006  1130  2904  2982  8510  8520  8525
F4$      0105  3670
F7$      0100  0104
FL#0     7010  7110  7210  7310
FL#1     7000  7100  7200  7300
FL#2     0100  0104  0110  0120  0130  0140  1000  1006  1130  2012
         2884  2904  2982  3100  3110  3120  8010  8090  8100  8110
         8510  8525  3660
FL#4     3670  3700  3708  3716  3724  3732  3740  3748
G1       4156  4170
G2       4410  4440  4460
G3       4460  4480  4584  4665  4675  4725  4760
G4       4560  4570  4584  4650  4660  4665  4675
G5       4566  4580  4582  4584
H0       3412  3452  3460  3724
I        2125  2130  2140  3348  3372  3388  3396  3420  3428  3436
         3444  3452  3460  3468  3476  3508  3516  3532  3540  3564
         3572  3580  3588  3612  3620  3628  3636  4100  4110  4115
         4240  4250  4260  8095  8100  8110  8130
I0       3444  3732
I1       3732
I1$      0020  2270  3130  4480  7010  7210
I2       0066  3732
I2$      0020  4570  4660  7110  7310
I3       3732
I9       3468
```

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       STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                        PAGE 18
                   SYMBOL TABLE FOR A000FAA604.AS

SYMBOL   REFERENCES
------   -------------------------------------------------------------
J        4066  4068  4070  4588  4592  4594  4596  4598  4600
J0       4440  8000  8005  8010  8030  8040  8140
K        3604  3620  3628
K0       0086  0120  2012  2706  2884  4001  4120  4350
L0       3404  3428  3436  3724
M        4562  4564  4566
M0       0080  1000  1006  1130  2696  2698  2704  2710  2720  2904
         2982  8000  8510  8525
M0$      0020  0028  4440
M1       0082  1000  1003  1006  1009  1080  1130  2840  2904  2980
         2982  3732  8510  8525
M2       0084  1000  1006  1130  2904  2912  2914  2916  2920  2922
         2924  2982  3000  3986  8510  8525
M2$      0024  2908  2912  2924
M5       1000  1006  1130  2904  2968  2970  2976  2982  8510  8525
N        8010  8090  8092  8095
N0       0140  3110
N1       0140  3110  3724
N2       0140  3110  3252  3420  3508  3564  3612  3724
N5       0120  2012  2884
P$       0100  0101  0102  0103  0104  0105  0106  0107  0108  0109
         2380  2542  2548  2560  3708
P0$      0100  0101  0104
P1$      0100  0102  0104
P2$      0100  0103  0104  2380  2500  2504  2508  2542  2546  2548
         2552  2558  2560
P5$      0106  2500
P6$      0107  2504
P7$      0108  2508
P8$      0109
P[       0022  8010  8020  8070
Q        4584  4586  4592  4594  4725  4730  4760  4827  4830
R        0075  0120  1012  1015  1110  2012  2842  2884
R0       0110
R0$      0100  0104
R1       0068  1000  1006  1012  1095  1130  2850  2858  2904  2982
         8510  8525
R1$      0012  0130  3708
R2$      0012  0130  3708
R3$      0012  0130  3708
R4$      0012  0130  3708
R7       8100  8120  8400
R8       8110  8120  8400
R9       4675  4680  4684
S        4152  4390  4540  4630  8070  8120  8400
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     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
6/4/1981                                                      PAGE 19
                        SYMBOL TABLE FOR A000FAA604.AS

SYMBOL    REFERENCES
------    -----------------------------------------------------------
 S0       0110  2720  2750
 S0$      0020  0040  0050  0060  2270  2310  3140
 S1$      0020
 S9       0090  0110  1030
 T0       0110
 T9       3356  3372  3388
 U0       0110
 U1$      0120  2012  2884
 U2$      0120  2012  2884
 V        3224  3740
 V1       3002  3668  3732  3980  3982  3994  4003  4010  4062  4152
          4802
 V2       3556  3644        3668  3732
 V[       0022  3292  3372  3388  3404  3412  3428  3436  3452  3460
          3516  3532  3572  3580  3620  3628
 W        0070  0120  1010  1020  1030  1060  1090  1120  2012  2870
          2878  2884
 W0       0092  0110  1010  1060  2170  2878
 W1       2150  2160  2170  2260  2290  3180  7000  7010  7200  7210
 W2       2280  2290  2291  2295  2320  7100  7110  7300  7310
 X        4665  4670  4684  4802  4810  4827
 X0       0120  2012  2884  4003
 X9       0120  2012  2884  4010
 Y0       0110
 Y9       0110
 Z0       3100
 Z1       3100
 Z1$      3120  3716
 Z2       3100
 Z2$      3120  3716
 Z3       3100  3268  3316  3788  3860  3868
 Z3$      3120  3716
 Z4       3180  3236
 Z4$      0024  3120  3140  3716
 Z5       3100  3292  3724
 Z5$      0024  3120  3130  3716
 Z6       3100  3244  3724
 Z7       0140  3110  3292  3724
 Z8       0140  3110  3348  3724
 Z9       0140  2922  3110  3332
```

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SECTION 8

ISCN.05 - THE STANDARD CALIBRATION PROGRAM

The calibration program ISCN.05 is invoked from the IRCL (ISCN.04) with the calibrate command. Figure 10 shows the overall flow of the ISCN.05 program. The program's purpose is to develop up to four equations relating sample concentration to observed sample absorbance. To do this the program must examine all sample records in the RUN data file (ISCN.DF) in order to acquire all absorbance measurements for calibration standards measured in the RUN. Every single replicate is given equal weight in the subsequent regression algorithm. Two counters are used in examining the standards - one counts the total number of replicate measurments (N1) while the other (NO) keeps track of the number of different standards measured prior to calibration. During this process high/low values are established for known concentrations (YO and Y9), and measured absorbances (XO and X9).

All concentration/absorbance pairs are written into the P1 array and are sorted by increasing absorbance. Regression is then performed on the points starting with a third degree fit and stepping down to a forced-zero linear fit. The P-array is used for the storage of subsequent polynomial coefficients. If a particular equation is disallowed, the P(I,5) position is set to a -1. The P(I,6) position is used to hold the computed fitting error for the equation. After all equations have been developed, the fitting error of the forced-zero linear equation is checked and if it exceeds 25% a cautionary message is transmitted to the user terminal.

After regression has been completed, the calibration plot file (ISCN.PT) is formed. Pertinent calibration data is stored from the lowest order equation to the highest order equation. Each block contains all of the information required by the calibration curve plot program (ISCN.08) for subsequent display of the curve. These data include header and axis information, polynomial parameters, and the absorbance vs. concentration points.

The calibration report is generated after the plot file is created. The report will be based on the computational mode (MO) which was current at the time of calibration unless the regression was impossible due to a limited number of standards. In this case, the mode will be down graded until a viable equation is encountered. If a mode change is required, the program will state the action to the user terminal before generating the calibration report. The report itself is stored in a list file (ISCN.LC) and is output to the device(s) specified with the output mode (M5).

On leaving the program, pertinent parameters are written into the transfer file (ISCN.TR) and the ISCN.04 peogram is accessed through

CHAINing. If an ESCape is pressed during the calibration process, the escape counter (E5) is incremented but no action is taken to terminate the process. This flag will be examined in the ISCN.04 program which will take action on the user-interrupt.

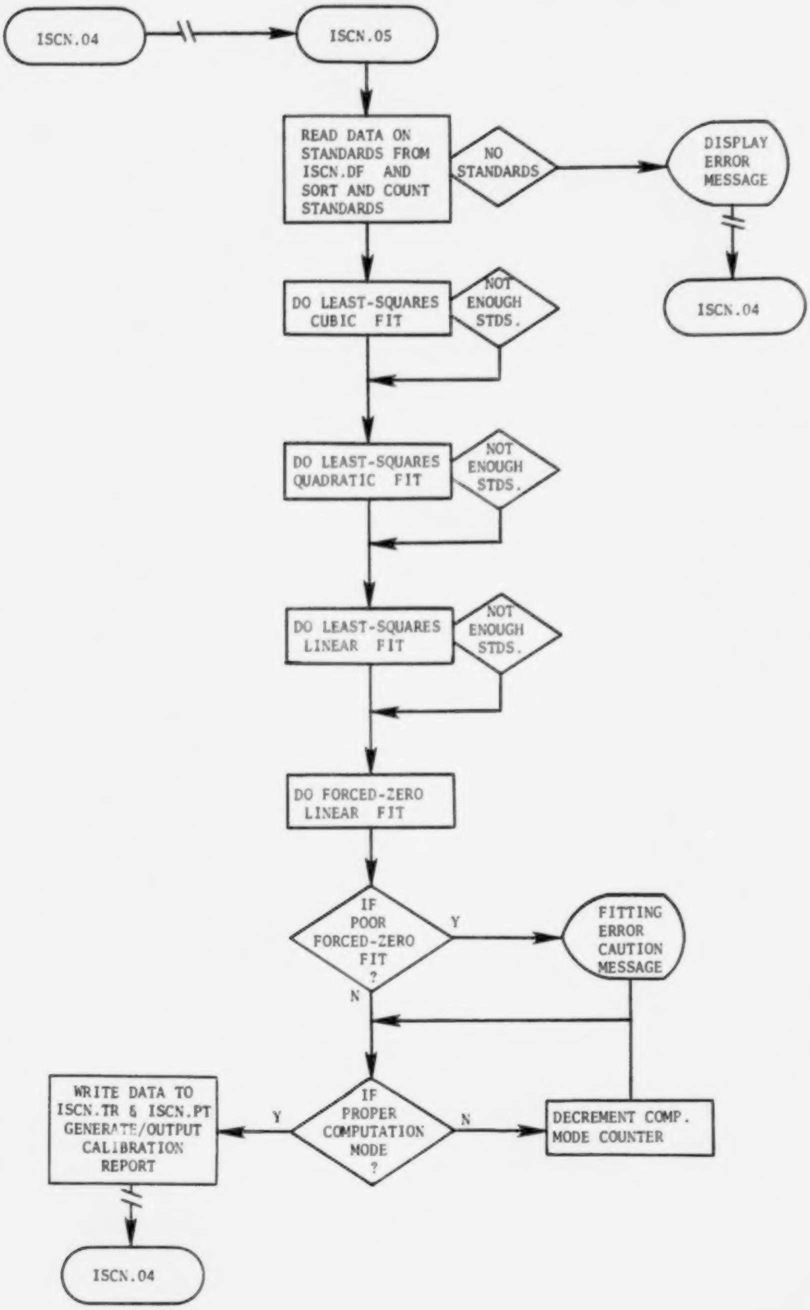
ISCN.04
ISCN.05
READ DATA ON STANDARDS FROM ISCN.DF AND SORT AND COUNT STANDARDS
NO STANDARDS
DISPLAY ERROR MESSAGE
ISCN.04
DO LEAST-SQUARES CUBIC FIT
NOT ENOUGH STDS.
DO LEAST-SQUARES QUADRATIC FIT
NOT ENOUGH STDS.
DO LEAST-SQUARES LINEAR FIT
NOT ENOUGH STDS.
DO FORCED-ZERO LINEAR FIT
IF POOR FORCED-ZERO FIT ?
Y
FITTING ERROR CAUTION MESSAGE
N
IF PROPER COMPUTATION MODE ?
Y
N
WRITE DATA TO ISCN.TR & ISCN.PT GENERATE/OUTPUT CALIBRATION REPORT
DECREMENT COMP. MODE COUNTER
ISCN.04

Figure 10. Program ISCN.05 -- Standard calibration module.

TABLE 11. SYMBOL DEFINITIONS FOR ISCN.05

A(	a regression array
A1$	the computational mode identifier string
B1	the number of instrument blanks in a wheel pattern
C	the computed concentration of a standard
C$	the IRCL command string
D	the degree of the regression equation
D0	the degree of the regression equation
D0$	the sample data array
E5	the ESCape counter
F(	a regression array
F$	the calibration report output format string
F3$	the name of the calibration report list file
F5$	the name of the calibration plot file
F7$	the name of the Run File
H(	a regression array
I	a counter
I$	a string from a list file
I0$	the LREAD record delimiter
I1$	the smaple identifier string
I2	a standard-sorting counter
I3	a standard-sorting counter
J	a counter
K	a counter
K0	the calibration flag
L1	a string length variable (U1$)
L2	a string length format variable (U2$)
L3	a field format variable
L4	a field format variable
M0	the computational mode flag
M1	the sequencing mode flag
M2	the data acquisition mode flag
M5	the output mode flag
M9	the computational mode-change flag
N0	the number of standards calibrated
N1	the number of measurements used in calibration
P$	the program and file prefix
P0$	the name of the program preceeding the calibration program (.04)
P1$	the name of the calibration program (.05)
P1(	the concentration vs. absorbance array
P2$	the program CHAINed to by the calibration program (.04)
P(	the regression coefficient and fitting error array
R	the replicate counter

TABLE 11 (Contd.)

R0	the number of reagent blanks in the wheel pattern
R0$	the PARMETH code in the Run File
R1	the number of replicate measurements per sample
R1$	the analyst's initial string
R2$	the analyte string
R3$	the concentration unit string
R4$	the instrument name string
R9	the difference between computed and know concentrations
S0	the number of calibration standards in a wheel pattern
S1	the calibration standard counter
S9	the position at which calibration occurs
T	a temporary variable
T0	a fitting error variable
T3	a standard-sorting temporary variable
T4	a standard-sorting temporary variable
T6	a number of timing standards in the wheel pattern
T9	a tabbing variable
U$	the number of unknowns in a wheel pattern
U1$	the absorbance value format string
U2$	the concentration value format string
W	the current wheel position
W0	the number of samples in a wheel pattern
W1	the wheel position counter
X0	the lowest calibration standard absorbance
X9	the highest calibration standard concentration
X(	the calibration standard absorbance array
X0	the lowest (non-zero) calibration standard concentration
Y2	the concentration summing variable
Y9	the highest calibration standard concentration
Y(	the calibration standard concentration array
Z	a temporary multiplier

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  1
                    PROGRAM LISTING FOR ISCN05.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.05 - CALIBRATES STANDARDS, PRODUCES       *
0040 REM *            REPORT IN FILE ISCN.LC, AND PRODUCES PLOT      *
0050 REM *            FILE ISCN.PT FOR PROGRAM ISCN.08               *
0060 REM *   BY: D.RYAN (UCCC), JULY 12, 1979                        *
0070 REM *   MOST RECENT REVISION: DECEMBER 27, 1979                 *
0080 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0090 ON ESC THEN GOSUB 3260
0100 ESC
0110 PRINT
0120 PRINT "MULTIPLE CURVE REGRESSION BEGINS"
0130 DIM R4$[16],D0$[25]
0140 DIM H[5,1],F[4,5],A[7,1],D1[25]
0150 DIM X[60],Y[60],P[5,6],P1[30,2]
0160 DIM U$[11],F$[80],I$[80],I1$[15],A1$[30]
0170 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0180 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T6,S9
0190 READ FILE[2,4],C$,W,R,K0,X0,X9,N1,U1$,U2$
0200 READ FILE[2,9],R1$,R2$,R3$,R4$
0210 READ FILE[2,15],M0,M1,R1,M2,M5,E5
0220 LET P0$=P$,".04"
0230 LET P1$=P$,".05"
0240 LET P2$=P$,".04"
0250 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0260 LET N1=0
0270 LET N0=0
0280 LET K0=0
0290 LET Y2=0
0300 LET S1=0
0310 LET U$="+++++#.####"
0320 LET Y9=-1E+50
0330 LET Y0=1E+50
0340 LET X9=-1E+50
0350 LET X0=1E+50
0360 FOR I=1 TO 5
0370   LET P[I,5]=-1
0380 NEXT I
0390 LET F3$=P$,".LC"
0400 LET F5$=P$,".PT"
0410 FOR W1=1 TO W0
0420   GOSUB 3320

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  2
                    PROGRAM LISTING FOR ISCN05.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
0430   IF D1[3]<>1 THEN GOTO 0630
0440   LET S1=S1+1
0450   IF D1[7]=0 THEN GOTO 0620
0460   LET N0=N0+1
0470   IF D1[5]<=Y9 THEN GOTO 0500
0480   LET Y9=D1[5]
0490   LET X9=D1[6]
0500   IF D1[5]>=Y0 THEN GOTO 0540
0510   IF D1[5]=0 THEN GOTO 0540
0520   LET Y0=D1[5]
0530   LET X0=D1[6]
0540   LET P1[N0,1]=D1[6]
0550   LET P1[N0,2]=D1[5]
0560   FOR J=1 TO D1[7]
0570     LET N1=N1+1
0580     LET X[N1]=D1[7+J]
0590     LET Y[N1]=D1[5]
0600     LET Y2=Y2+Y[N1]
0610   NEXT J
0620   IF S1=S0 THEN GOTO 0660
0630 NEXT W1
0640 LET K0=-999
0650 GOTO 3110
0660 IF N0>=1 THEN IF Y9>0 THEN GOTO 0680
0670 GOTO 0640
0680 IF N0=1 THEN GOTO 0800
0690 FOR I3=N0-1 TO 1 STEP -1
0700   FOR I2=1 TO I3
0710     IF P1[I2,1]<P1[I2+1,1] THEN GOTO 0780
0720     LET T3=P1[I2,1]
0730     LET T4=P1[I2,2]
0740     LET P1[I2,1]=P1[I2+1,1]
0750     LET P1[I2,2]=P1[I2+1,2]
0760     LET P1[I2+1,1]=T3
0770     LET P1[I2+1,2]=T4
0780   NEXT I2
0790 NEXT I3
0800 LET Y2=Y2/N1
0810 IF N0>=2 THEN LET P[5,5]=0
0820 LET P[1,5]=0
0830 IF ABS(X9)>99999 THEN GOTO 0880
0840 IF ABS(X9)<.1 THEN GOTO 0880

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

TYPING GUIDE SHEET

PROGRAM LISTING FOR ISCN05.AS

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0850 LET L1=LEN(STR$(INT(ABS(X9))))
0860 LET U1$=U$[6-L1,12-L1]
0870 GOTO 0890
0880 LET U1$="+#.###^^^^"
0890 IF ABS(Y9)>99999 THEN GOTO 0940
0900 IF ABS(Y9)<.1 THEN GOTO 0940
0910 LET L2=LEN(STR$(INT(ABS(Y9))))
0920 LET U2$=U$[6-L2,12-L2]
0930 GOTO 0950
0940 LET U2$="+#.###^^^^"
0950 LET D=4
0960 LET D=D-1
0970 IF D>1 THEN IF N0<D+1 THEN GOTO 0960
0980 MAT F=ZER[D+1,D+2]
0990 MAT H=ZER[D+2,1]
1000 MAT A=ZER[2*D+1]
1010 LET A[1]=N1
1020 FOR I=1 TO N1
1030   FOR J=2 TO 2*D+1
1040     LET A[J,1]=A[J,1]+X[I]^(J-1)
1050   NEXT J
1060   FOR K=1 TO D+1
1070     LET F[K,D+2]=H[K,1]+Y[I]*X[I]^(K-1)
1080     LET H[K,1]=H[K,1]+Y[I]*X[I]^(K-1)
1090   NEXT K
1100   LET H[D+2,1]=H[D+2,1]+Y[I]^2
1110 NEXT I
1120 FOR J=1 TO D+1
1130   FOR K=1 TO D+1
1140     LET F[J,K]=A[J+K-1]
1150   NEXT K
1160 NEXT J
1170 LET P[1,2]=H[2,1]/F[2,2]
1180 FOR J=1 TO D+1
1190   FOR K=J TO D+1
1200     IF F[K,J]<>0 THEN GOTO 1230
1210   NEXT K
1220   GOTO 1510
1230   FOR I=1 TO D+2
1240     LET T=F[J,I]
1250     LET F[J,I]=F[K,I]
1260     LET F[K,I]=T

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN05.AS

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1270   NEXT I
1280   LET Z=1/F[J,J]
1290   FOR I=1 TO D+2
1300     LET F[J,I]=Z*F[J,I]
1310   NEXT I
1320   FOR K=1 TO D+1
1330     IF K=J THEN GOTO 1380
1340     LET Z=-F[K,J]
1350     FOR I=1 TO D+2
1360       LET F[K,I]=F[K,I]+Z*F[J,I]
1370     NEXT I
1380   NEXT K
1390 NEXT J
1400 FOR J=1 TO D+1
1410   LET P[D+1,J]=F[J,D+2]
1420 NEXT J
1430 LET P[D+1,5]=0
1440 IF N1>(D+1) THEN GOTO 1460
1450 GOTO 1510
1460 LET T0=0
1470 FOR I=1 TO N1
1480   LET T0=T0+(Y[I]-(P[D+1,1]+X[I]*(P[D+1,2]+X[I]*(P[D+1,3]+X[I]*P[
*    D+1,4]))))^2
1490 NEXT I
1500 LET P[D+1,6]=100*SQR(T0/(N1-(D+1)))/Y2
1510 IF D>1 THEN GOTO 0960
1520 IF N1<=1 THEN GOTO 1620
1530 LET T0=0
1540 FOR I=1 TO N1
1550   LET T0=T0+(Y[I]-P[1,2]*X[I])^2
1560 NEXT I
1570 LET P[1,6]=100*SQR(T0/(N1-1))/Y2
1580 IF P[1,6]<=25 THEN GOTO 1620
1590 PRINT
1600 PRINT "<7>SERIOUS PROBLEMS DETECTED DURING CALIBRATION!"
1610 PRINT "<7>PLEASE REVIEW CALIBRATION PLOT(S) OR TABLE(S)."
1620 PRINT
1630 PRINT "MULTIPLE CURVE REGRESSION COMPLETED"
1640 GOTO 1700
1650 IF SYS(7)<>-48 THEN GOTO 1720
1660 PRINT
1670 PRINT "<7>PLOT FILE IS IN USE! CANNOT CONTINUE!<7>"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
1680 PRINT "<7>TEN SECOND DELAY AND TRY AGAIN!<7>"
1690 DELAY =10
1700 ON ERR THEN GOTO 1650
1710 RENAME F5$,F5$
1720 ON ERR THEN STOP
1730 OPEN FILE[5,1],F5$
1740 FOR I=1 TO 5
1750   IF P[I,5]=-1 THEN GOTO 1940
1760   WRITE FILE[5],R1$
1770   WRITE FILE[5],R4$
1780   WRITE FILE[5],R2$
1790   WRITE FILE[5],R3$
1800   WRITE FILE[5],"ABSORBANCE"
1810   IF I<5 THEN GOTO 1850
1820   WRITE FILE[5],0,0,0,0,0
1830   WRITE FILE[5],N0,0,SYS(2),SYS(1),SYS(3)
1840   GOTO 1910
1850   IF I>1 THEN GOTO 1880
1860   LET D0=1
1870   GOTO 1890
1880   LET D0=I-1
1890   WRITE FILE[5],D0,P[I,1],P[I,2],P[I,3],P[I,4]
1900   WRITE FILE[5],N0,P[I,6],SYS(2),SYS(1),SYS(3)
1910   FOR J=1 TO N0
1920     WRITE FILE[5],P1[J,1],P1[J,2]
1930   NEXT J
1940   IF I=5 THEN GOTO 2000
1950   WRITE FILE[2,4+I],N0,D0,P[I,1],P[I,2],P[I,3],P[I,4],P[I,5],P[I,
*        6]
1960   IF I<>1 THEN GOTO 2000
1970   FOR J=1 TO N0
1980     WRITE FILE[2,19+J],P1[J,1],P1[J,2]
1990   NEXT J
2000 NEXT I
2010 CLOSE FILE[5]
2020 OPEN FILE[3,1],F3$,80
2030 LET S1=0
2040 LET M9=M0
2050 NOESC
2060 IF P[M9+1,5]<>-1 THEN GOTO 2150
2070 IF M9<>4 THEN GOTO 2130
2080 LET M9=0

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
2090 WRITE FILE[2,15],M9,M1,R1,M2,M5,E5
2100 PRINT
2110 PRINT "<7>MODE CHANGE REQUIRED FROM ";M0;" TO ";M9
2120 GOTO 2060
2130 LET M9=M9-1
2140 GOTO 2090
2150 ESC
2160 LET D=M9
2170 PRINT FILE[3]
2180 PRINT FILE[3], TAB(21);"CALIBRATION STANDARD'S TABLE"
2190 PRINT FILE[3]
2200 IF D=0 THEN LET A1$="LINEAR THROUGH ORIGIN"
2210 IF D=1 THEN LET A1$="LINEAR"
2220 IF D=2 THEN LET A1$="QUADRATIC"
2230 IF D=3 THEN LET A1$="CUBIC"
2240 IF D=4 THEN LET A1$="INTERPOLATE"
2250 PRINT FILE[3], TAB(5);"MODE: ";A1$; TAB(38);
2260 PRINT FILE[3],USING "TIME: ##:## ON ##/##/####",SYS(11),SYS(12),S
*    YS(2),SYS(1),SYS(3)
2270 PRINT FILE[3], TAB(5);"NUMBER OF STDS: ";N0; TAB(38);
2280 PRINT FILE[3],"HIGHEST STD:";Y9
2290 PRINT FILE[3], TAB(5);
2300 PRINT FILE[3],USING "FITTING ERROR: ----#.## %         ",P[D+1,6];
2310 PRINT FILE[3],"LOWEST STD: ";Y0
2320 PRINT FILE[3]
2330 IF D=4 THEN GOTO 2480
2340 LET T9=INT(18-5*D)
2350 PRINT FILE[3], TAB(T9);"EQUATION:  CONC=";
2360 FOR I=1 TO 4
2370   IF P[D+1,I]=0 THEN GOTO 2460
2380   PRINT FILE[3],USING "+#.##^^^^",P[D+1,I];
2390   ON I THEN GOTO 2460, 2410, 2430, 2450
2400   GOTO 2460
2410   PRINT FILE[3],"*ABS";
2420   GOTO 2460
2430   PRINT FILE[3],"*ABS^2";
2440   GOTO 2460
2450   PRINT FILE[3],"*ABS^3";
2460 NEXT I
2470 PRINT FILE[3]
2480 PRINT FILE[3]
2490 PRINT FILE[3]," WHEEL     STANDARD      NO.     AVE";

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2500 PRINT FILE[3],"          CONC       CONC"
2510 PRINT FILE[3],"  POS      IDENTIFIER    REPS      ABS";
2520 PRINT FILE[3],"         EXPECT     FOUND        DIFF"
2530 LET F$="  -#                                                      "
2540 LET L4=11
2550 LET L3=L4-INT(LEN(U1$)/2)
2560 LET F$[L3,L3+LEN(U1$)-1]=U1$
2570 LET L4=L4+11
2580 IF L4>50 THEN GOTO 2620
2590 LET L3=L4-INT(LEN(U2$)/2)
2600 LET F$[L3,L3+LEN(U2$)-1]=U2$
2610 GOTO 2570
2620 FOR W1=1 TO W0
2630   GOSUB 3320
2640   IF D1[3]<>1 THEN GOTO 2790
2650   LET S1=S1+1
2660   PRINT FILE[3],USING "  ###   ",W1;
2670   PRINT FILE[3],I1$;
2680   IF D1[7]>0 THEN GOTO 2710
2690   PRINT FILE[3],"     STANDARD HAS NO AVAILABLE DATA!"
2700   GOTO 2780
2710   IF D<>4 THEN GOTO 2750
2720   LET C=D1[5]
2730   LET R9=0
2740   GOTO 2770
2750   LET C=P[D+1,1]+D1[6]*(P[D+1,2]+D1[6]*(P[D+1,3]+D1[6]*P[D+1,4]))
2760   LET R9=D1[5]-C
2770   PRINT FILE[3],USING F$,D1[7],D1[6],D1[5],C,R9
2780   IF S1=S0 THEN GOTO 2800
2790 NEXT W1
2800 PRINT FILE[3]
2810 CLOSE FILE[3]
2820 IF M5=3 THEN GOTO 3110
2830 IF M5=0 THEN GOTO 3040
2840 OPEN FILE[3,3],F3$,80
2850 GOTO 2890
2860 PRINT "X";
2870 IF SYS(7)<>-48 THEN STOP
2880 DELAY =2.3
2890 ON ERR THEN GOTO 2860
2900 OPEN FILE[6,1],"$LPT"
2910 ON ERR THEN STOP

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2920 PRINT
2930 PRINT "CALIBRATION REPORT IS NOW BEING GENERATED"
2940 FOR I=1 TO 1000
2950   LREAD FILE[3],I$,I0$
2960   IF EOF(3)=1 THEN GOTO 3000
2970   LET I$=I$,I0$
2980   PRINT FILE[6],I$;
2990 NEXT I
3000 CLOSE FILE[6]
3010 LET I$=I$,I0$
3020 CLOSE FILE[3]
3030 IF M5=1 THEN GOTO 3110
3040 OPEN FILE[3,3],F3$,80
3050 FOR I=1 TO 1000
3060   LREAD FILE[3],I$,I0$
3070   IF EOF(3)=1 THEN GOTO 3100
3080   PRINT I$;I0$;
3090 NEXT I
3100 CLOSE FILE[3]
3110 NOESC
3120 IF K0=0 THEN GOTO 3170
3130 LET K0=0
3140 PRINT "<13><7><7>CALIBRATION IMPOSSIBLE!<7><7>"
3150 PRINT
3160 GOTO 3180
3170 LET K0=1
3180 WRITE FILE[2,4],C$,W,R,K0,X0,X9,N1,U1$,U2$
3190 WRITE FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T6,S9
3200 NOESC
3210 ON ERR THEN GOTO 3230
3220 CHAIN P2$
3230 ON ERR THEN STOP
3240 ESC
3250 STOP
3260 NOESC
3270 READ FILE[2,15],M0,M1,R1,M2,M5,E5
3280 LET E5=E5+1
3290 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
3300 ESC
3310 RETURN
3320 MAT READ FILE[1,W1],D1
3330 READ FILE[0,W1],I1$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE  9
                        PROGRAM LISTING FOR ISCN05.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3340 RETURN












































1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 10
                            SYMBOL TABLE FOR ISCN05.AS

SYMBOL    REFERENCES
------ -------------------------------------------------------------------
 0500  0470
 0540  0500  0510
 0620  0450
 0630  0430
 0640  0670
 0660  0620
 0680  0660
 0780  0710
 0800  0680
 0880  0830  0840
 0890  0870
 0940  0890  0900
 0950  0930
 0960  0970  1510
 1230  1200
 1380  1330
 1460  1440
 1510  1220  1450
 1620  1520  1580
 1650  1700
 1700  1640
 1720  1650
 1850  1810
 1880  1850
 1890  1870
 1910  1840
 1940  1750
 2000  1940  1960
 2060  2120
 2090  2140
 2130  2070
 2150  2060
 2410  2390
 2430  2390
 2450  2390
 2460  2370  2390  2400  2420  2440
 2480  2330
 2570  2610
 2620  2580
 2710  2680
 2750  2710
 2770  2740
 2780  2700
 2790  2640
 2800  2780
```

```
     STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                 PAGE 11
                   SYMBOL TABLE FOR ISCN05.AS

SYMBOL   REFERENCES
------   ------------------------------------------------------------
 2860    2890
 2890    2850
 3000    2960
 3040    2830
 3100    3070
 3110    0650  2820  3030
 3170    3120
 3180    3160
 3230    3210
 3260    0090
 3320    0420  2630
 A       1000
 A1$     0160  2200  2210  2220  2230  2240  2250
 A[      0140  1010  1040  1140
 B0      0180  3190
 C       2720  2750  2760  2770
 C$      0190  3180
 D       0950  0960  0970  0980  0990  1000  1030  1060  1070  1100
         1120  1130  1180  1190  1230  1290  1320  1350  1400  1410
         1430  1440  1480  1500  1510  2160  2200  2210  2220  2230
         2240  2300  2330  2340  2370  2380  2710  2750
 D0      1860  1880  1890  1950
 D0$     0130  0170  0250
 D1      3320
 D1[     0140  0430  0450  0470  0480  0490  0500  0510  0520  0530
         0540  0550  0560  0580  0590  2640  2680  2720  2750  2760
         2770
 E5      0210  2090  3270  3280  3290
 F       0980
 F$      0160  2530  2560  2600  2770
 F3$     0390  2020  2840  3040
 F5$     0400  1710  1730
 F7$     0170  0250
 FL#0    3330
 FL#1    3320
 FL#2    0170  0180  0190  0200  0210  0250  1950  1980  2090  3180
         3190  3270  3290
 FL#3    2020  2170  2180  2190  2250  2260  2270  2280  2290  2300
         2310  2320  2350  2380  2410  2430  2450  2470  2480  2490
         2500  2510  2520  2660  2670  2690  2770  2800  2810  2840
         2950  3020  3040  3060  3100
 FL#5    1730  1760  1770  1780  1790  1800  1820  1830  1890  1900
         1920  2010
 FL#6    2900  2980  3000
 F[      0140  1070  1140  1170  1200  1240  1250  1260  1280  1300
```

```
     STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                 PAGE 12
                   SYMBOL TABLE FOR ISCN05.AS

SYMBOL   REFERENCES
------   ------------------------------------------------------------
         1340  1360  1410
 H       0990
 H[      0140  1070  1080  1100  1170
 I       0360  0370  0380  1020  1040  1070  1080  1100  1110  1230
         1240  1250  1260  1270  1290  1300  1310  1350  1360  1370
         1470  1480  1490  1540  1550  1560  1740  1750  1810  1850
         1880  1890  1900  1940  1950  1960  2000  2360  2370  2380
         2390  2460  2940  2990  3050  3090
 I$      0160  2950  2970  2980  3010  3060  3080
 I0$     2950  2970  3010  3060  3080
 I1$     0160  2670  3330
 I2      0700  0710  0720  0730  0740  0750  0760  0770  0780
 I3      0690  0700  0790
 J       0560  0580  0610  1030  1040  1050  1120  1140  1160  1180
         1190  1200  1240  1250  1280  1300  1330  1340  1360  1390
         1400  1410  1420  1910  1920  1930  1970  1980  1990
 K       1060  1070  1080  1090  1130  1140  1150  1190  1200  1210
         1250  1260  1320  1330  1340  1360  1380
 K0      0190  0280  0640  3120  3130  3170  3180
 L1      0850  0860
 L2      0910  0920
 L3      2550  2560  2590  2600
 L4      2540  2550  2570  2580  2590
 M0      0210  2040  2110  3270  3290
 M1      0210  2090  3270  3290
 M2      0210  2090  3270  3290
 M5      0210  2090  2820  2830  3030  3270  3290
 M9      2040  2060  2070  2080  2090  2110  2130  2160
 N0      0270  0460  0540  0550  0660  0680  0690  0810  0970  1830
         1900  1910  1950  1970  2270
 N1      0190  0260  0570  0580  0590  0600  0800  1010  1020  1440
         1470  1500  1520  1540  1570  3180
 P$      0170  0220  0230  0240  0250  0390  0400
 P0$     0170  0220  0250
 P1$     0170  0230  0250
 P1[     0150  0540  0550  0710  0720  0730  0740  0750  0760  0770
         1920  1980
 P2$     0170  0240  0250  3220
 P[      0150  0370  0810  0820  1170  1410  1430  1480  1500  1550
         1570  1580  1750  1890  1900  1950  2060  2300  2370  2380
         2750
 R       0190  3180
 R0      0180  3190
 R0$     0170  0250
 R1      0210  2090  3270  3290
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                          PAGE 13
                         SYMBOL TABLE FOR ISCN05.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------
 R1$    0200  1760
 R2$    0200  1780
 R3$    0200  1790
 R4$    0130  0200  1770
 R9     2730  2760  2770
 S0     0180  0620  2780  3190
 S1     0300  0440  0620  2030  2650  2780
 S9     0180  3190
 T      1240  1260
 T0     1460  1480  1500  1530  1550  1570
 T3     0720  0760
 T4     0730  0770
 T6     0180  3190
 T9     2340  2350
 U$     0160  0310  0860  0920
 U0     0180  3190
 U1$    0190  0860  0880  2550  2560  3180
 U2$    0190  0920  0940  2590  2600  3180
 W      0190  3180
 W0     0180  0410  2620  3190
 W1     0410  0630  2620  2660  2790  3320  3330
 X0     0190  0350  0530  3180
 X9     0190  0340  0490  0830  0840  0850  3180
 X[     0150  0580  1040  1070  1080  1480  1550
 Y0     0180  0330  0500  0520  2310  3190
 Y2     0290  0600  0800  1500  1570
 Y9     0180  0320  0470  0480  0660  0890  0900  0910  2280  3190
 Y[     0150  0590  0600  1070  1080  1100  1480  1550
 Z      1280  1300  1340  1360
```

SECTION 9

ISCN.06 - THE INTERIM REPORT GENERATOR

The interim report generator program (ISCN.06) is accessed from the ISCN.04 program with the 'R' command. This command may be automatically generated after an automatic sequence of measurements is completed or may be input by an analyst after post-analysis editing. The program combines the features of the calibration curve report generator (in ISCN.05), the sample-specific report generator (in ISCN.04), and a small header generator in order to produce a complete description of the current RUN status. Figure 11 shows the function and flow of the ISCN.06 program.

The program is straight forward. It produces a list file (ISCN.LR) containing the report results and facilitates the output of this file to the device specified by the current output mode (M5). The concentration computation subroutine is identical to that used in the ISCN.04 program.

One noteable feature of this program is that, if standards have been calibrated, all standard's data will appear in the standard calibration table preceeding the main body of the report. The form of the interim report is dramatically altered if calibration has not been performed prior to report generation since no concentrations or QC assessments can be computed.

After the report has been produced and output, the IRCL is again invoked through a CHAIN to the ISCN.04 program. The ESCape mechanism in the ISCN.06 program is affectively disabled, however, the escape counter (E5) is incremented if the user presses the ESCape key during the report generation process. This feature is superfluous since a fully automatic sequence is complete after an interim report has been generated.

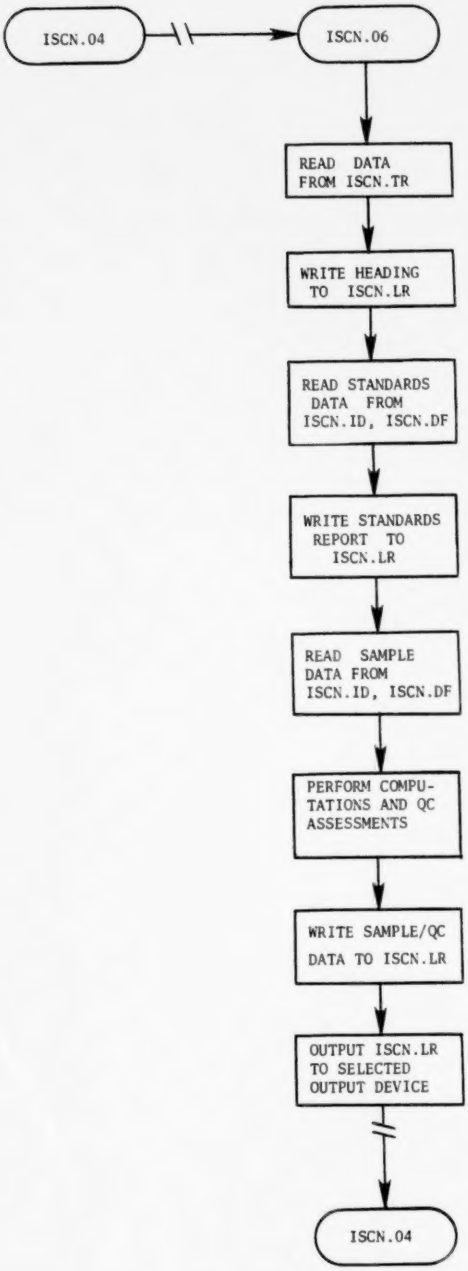
ISCN.04
ISCN.06
READ DATA FROM ISCN.TR
WRITE HEADING TO ISCN.LR
READ STANDARDS DATA FROM ISCN.ID, ISCN.DF
WRITE STANDARDS REPORT TO ISCN.LR
READ SAMPLE DATA FROM ISCN.ID, ISCN.DF
PERFORM COMPUTATIONS AND QC ASSESSMENTS
WRITE SAMPLE/QC DATA TO ISCN.LR
OUTPUT ISCN.LR TO SELECTED OUTPUT DEVICE
ISCN.04

Figure 11. Program ISCN.06 -- Interim report generator.

TYPING GUIDE SHEET

TABLE 12. SYMBOL DEFINITIONS FOR ISCN.06

A1	the replicate concentration of a sample
A1$	the computation mode string
A2	the sum of squares and standard deviation value
B0	the number of instrument blanks in the wheel pattern
C	the computed concentration for a calibration standard
C$	the IRCL command string
C1	the computed concentration of a sample
C7	an interpolation parameter - the low concentration
C8	an interpolation parameter - the high concentration
D	the dilution factor
D0$	the date code for the Run File
D1(	the data array for the current sample
D2(	the data array for the previous (primary) QC member
ES	the ESCape counter
F$	the output format field
F3$	the interim report list file name
F7$	the name of the Run File
G2	the average concentration of a sample
G3	the reportable sample concentration
G4	the reported value for the primary QC member
G5	the reported spike value (LSA)
I	a counter
I0$	a list file record delimiter
I1$	the current sample identifier string
I2$	the sample identifer string of the primary QC member
J	a counter
J0	an integer representing computational mode
K	a counter
K0	the calibration flag
M	the mass of a spike
M0$	the computation mode super-string
M1	the sequencing mode flag
M2	the data acquisition mode flag
M5	the output mode flag
M9	the computation mode-change flag
N	the number of standards actually calibrated
N1	the number of standards actually calibrated
P$	the program and data file prefix
P0	a dummy variable
P0$	the program preceding the report generator (.04)
P1	a regression equation coefficient

TABLE 12 (Contd.)

P1$	the name of the current program (.06)
P2	the regression equation coefficient
P2$	the name of the program to be CHAINed to (.04)
P3	a regression equation coefficient
P4	a regression equation coefficient
P5	the acceptability flag for a given regression equation
P6	the fitting error for a given regression equation
Q	the QC assessment value
R	the replicate counter
R0	the number of reagent blanks in the wheel pattern
R0$	the PARMETH code in the Run File
R1	the number of replicates measurements per sample
R1$	the analyst's initial string
R2$	the analyte name string
R3$	the concentration units string
R4$	the instrument name string
R7	an interpolation parameter - the low absorbance
R8	an interpolation parameter - the high absorbance
R9	the difference between computed and known standard concentrations
S	the sample absorbance
S0	the number of standards in the wheel pattern
S0$	the sample identifier super string
S1	the calibration standard counter
S1$	the comment string
S9	the position at which calibration occurs
T0	the number of timing standards in the wheel pattern
T9	a tabbing variable
U0	the number of unknowns in the wheel pattern
U1$	the sample absorbance format field
U2$	the sample concentration format field
W	the current wheel position
W0	the number of samples in the wheel pattern
W1	the wheel position counter
W2	the position of a primary QC member
X	a QC assessment variable
X0	the lowest calibration standard absorbence
X9	the highest calibration standard absorbance
Y0	the lowest (non-zero) calibration standard concentration
Y9	the highest calibration standard concentration

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  1
                       PROGRAM LISTING FOR ISCN06.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.06 - INTERIM REPORT GENERATOR              *
0040 REM *   BY D.RYAN (UCCC), OCTOBER 26, 1979                        *
0050 REM *   MOST RECENT REVISION: DECEMBER 27, 1979                   *
0060 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0070 ON ESC THEN GOSUB 2930
0080 ESC
0090 DIM S0$[150],M0$[20],I1$[15],I2$[15],S1$[80]
0100 DIM I$[80],D0$[20],A1$[25]
0110 DIM D1[25],D2[25],P[6]
0120 DIM K$[80],F$[80],R4$[16],D0$[20]
0130 LET M0$="FZERLINRQUADCUBCINTR"
0140 LET C0$="HMCREFKSP"
0150 LET S0$="TIMING SET STD  INSTR CAL STD UNKNOWN SAMPLE    SPIKE  0
*    F  "
0160 LET S0$=S0$,"   CHECK  OF    DUPLICATE  OF  LAB CNTRL STD "
0170 LET S0$=S0$," REAGENT BLANK  SURROGATE SPK   INSTR BLANK  "
0180 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0190 LET P0$=P$,".04"
0200 LET P1$=P$,".06"
0210 LET P2$=P$,".04"
0220 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0230 LET F3$=P$,".LR"
0240 LET F6$=P$,".LC"
0250 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0260 READ FILE[2,4],C$,W,R,K0,X0,X9,N1,U1$,U2$
0270 READ FILE[2,9],R1$,R2$,R3$,R4$
0280 READ FILE[2,15],M0,M1,R1,M2,M5,E5
0290 OPEN FILE[3,1],F3$,80
0300 PRINT FILE[3]
0310 PRINT FILE[3], TAB(18);"STANDARD CALIBRATION INTERIM REPORT"
0320 PRINT FILE[3]
0330 PRINT FILE[3], TAB(5);"INSTRUMENT: ";R4$; TAB(38);
0340 PRINT FILE[3],USING "DATE: ##/##/####  ##:##",SYS(2),SYS(1),SYS(3
*     ),SYS(11),SYS(12)
0350 PRINT FILE[3], TAB(5);"ANALYST: ";R1$; TAB(38);
0360 PRINT FILE[3],"ANALYTE: ";R2$
0370 PRINT FILE[3], TAB(5);"UNITS: ";R3$; TAB(38);
0380 PRINT FILE[3],"RUN FILE NAME: ";F7$
0390 PRINT FILE[3], TAB(5);"PARMETH CODE: ";R0$; TAB(38);
0400 PRINT FILE[3],"RF CREATED: ";D0$[4,8];"/";D0$[1,2];D0$[9,14]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  2
                       PROGRAM LISTING FOR ISCN06.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0410 PRINT FILE[3]
0420 PRINT FILE[3], TAB(31);"COMMENTS:"
0430 FOR I=1 TO 5
0440   READ FILE[2,I+9],S1$
0450   IF LEN(S1$)=0 THEN GOTO 0470
0460   PRINT FILE[3], TAB(INT((72-LEN(S1$))/2));S1$
0470 NEXT I
0480 IF K0=1 THEN GOTO 0490
0482 LET U1$="+#.##^^^^"
0484 LET U2$="+#.##^^^^"
0486 GOTO 1020
0490 IF M0<>4 THEN GOTO 0520
0500 READ FILE[2,5],N
0510 GOTO 0530
0520 READ FILE[2,5+M0],N,M9,P1,P2,P3,P4,P5,P6
0530 PRINT FILE[3]
0540 PRINT FILE[3], TAB(21);"CALIBRATION STANDARD'S TABLE"
0550 PRINT FILE[3]
0560 IF M0=0 THEN LET A1$="LINEAR THROUGH ORIGIN"
0570 IF M0=1 THEN LET A1$="LINEAR"
0580 IF M0=2 THEN LET A1$="QUADRATIC"
0590 IF M0=3 THEN LET A1$="CUBIC"
0600 IF M0=4 THEN LET A1$="INTERPOLATE"
0610 PRINT FILE[3], TAB(5);"MODE: ";A1$; TAB(38);
0620 PRINT FILE[3],USING "TIME: ##:## ON ##/##/####",SYS(11),SYS(12),S
*     YS(2),SYS(1),SYS(3)
0630 PRINT FILE[3], TAB(5);"NUMBER OF STDS: ";N; TAB(38);
0640 PRINT FILE[3],"HIGHEST STD:";Y9
0650 PRINT FILE[3], TAB(5);
0660 PRINT FILE[3],USING "FITTING ERROR: ----#.## %        ",P6;
0670 PRINT FILE[3],"LOWEST STD: ";Y0
0680 PRINT FILE[3]
0690 IF M0=4 THEN GOTO 0770
0700 LET T9=INT(18-5*M0)
0710 PRINT FILE[3], TAB(T9);"EQUATION:  CONC=";
0720 IF P1<>0 THEN PRINT FILE[3],USING "+#.##^^^^",P1;
0730 IF P2<>0 THEN PRINT FILE[3],USING "+#.##^^^^*ABS",P2;
0740 IF P3<>0 THEN PRINT FILE[3],USING "+#.##^^^^*ABS^2",P3;
0750 IF P4<>0 THEN PRINT FILE[3],USING "+#.##^^^^*ABS^3",P4;
0760 PRINT FILE[3]
0770 PRINT FILE[3]
0780 PRINT FILE[3]," WHEEL     STANDARD      NO.     AVE";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  3
                   PROGRAM LISTING FOR ISCN06.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0790 PRINT FILE[3],"        CONC       CONC"
0800 PRINT FILE[3],"  POS       IDENTIFIER     REPS       ABS";
0810 PRINT FILE[3],"       EXPECT     FOUND        DIFF"
0820 LET F$="  -#                                          "
0822 LET L4=11
0824 LET L3=L4-INT(LEN(U1$)/2)
0826 LET F$[L3,L3+LEN(U1$)-1]=U1$
0828 LET L4=L4+11
0830 IF L4>50 THEN GOTO 0838
0832 LET L3=L4-INT(LEN(U2$)/2)
0834 LET F$[L3,L3+LEN(U2$)-1]=U2$
0836 GOTO 0828
0838 FOR W1=1 TO W0
0840   GOSUB 2660
0850   IF D1[3]<>1 THEN GOTO 1000
0860   LET S1=S1+1
0870   PRINT FILE[3],USING "  ###   ",W1;
0880   PRINT FILE[3],I1$;
0890   IF D1[7]>0 THEN GOTO 0920
0900   PRINT FILE[3],"     STANDARD HAS NO AVAILABLE DATA!"
0910   GOTO 0990
0920   IF M0<>4 THEN GOTO 0960
0930   LET C=D1[5]
0940   LET R9=0
0950   GOTO 0980
0960   LET C=P1+D1[6]*(P2+D1[6]*(P3+D1[6]*P4))
0970   LET R9=D1[5]-C
0980   PRINT FILE[3],USING F$,D1[7],D1[6],D1[5],C,R9
0990   IF S1=S0 THEN GOTO 1010
1000 NEXT W1
1010 PRINT FILE[3]
1020 LET W1=0
1030 LET W1=W1+1
1040 IF W1>W0 THEN GOTO 2320
1050 GOSUB 2660
1060 IF K0=1 THEN IF D1[3]=1 THEN GOTO 1030
1070 PRINT FILE[3]
1080 PRINT FILE[3],USING "POS ### ",W1;
1090 PRINT FILE[3],"/";I1$;"/";S0$[D1[3]*15+1,(D1[3]+1)*15];
1100 LET W2=D1[2]
1110 IF W2<W1 THEN IF W2>=1 THEN GOTO 1170
1120 IF W2<>0 THEN GOTO 1150

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  4
                   PROGRAM LISTING FOR ISCN06.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1130 PRINT FILE[3]
1140 GOTO 1220
1150 IF W2=-1 THEN GOTO 1210
1160 GOTO 1220
1170 GOSUB 2690
1180 PRINT FILE[3],S0$[D2[3]*15+1,(D2[3]+1)*15];
1190 PRINT FILE[3],USING " IN POS ###",W2
1200 GOTO 1220
1210 PRINT FILE[3]," (HAS QC)"
1220 IF D1[7]<=0 THEN GOTO 1030
1230 PRINT FILE[3],"NO.REPS = ";D1[7];"     AVE.ABS = ";
1240 PRINT FILE[3],USING U1$,D1[6];
1250 IF D1[3]>1 THEN IF D1[3]<9 THEN GOTO 1280
1260 PRINT FILE[3]
1270 GOTO 1030
1280 IF D1[3]=4 THEN GOTO 2240
1290 IF D1[3]=7 THEN GOTO 1330
1300 IF D1[6]>=X0 THEN GOTO 1330
1310 PRINT FILE[3],"                         ***BELOW SCALE!"
1320 GOTO 1370
1330 IF D1[6]>=X9 THEN GOTO 1360
1340 PRINT FILE[3]
1350 GOTO 1370
1360 PRINT FILE[3],"                         ***ABOVE SCALE!"
1370 IF K0=1 THEN GOTO 1390
1380 GOTO 1030
1390 LET A2=0
1400 LET S=D1[6]
1410 GOSUB 2720
1420 LET G2=C1
1430 PRINT FILE[3],"  AVE.CONC     = ";
1440 PRINT FILE[3],USING U2$,G2;
1450 PRINT FILE[3],"  (";M0$[(J0-1)*4+1,J0*4];")"
1460 FOR I=1 TO D1[7]
1470   LET S=D1[7+I]
1480   GOSUB 2720
1490   LET A1=C1
1500   LET A2=A2+(A1-G2)^2
1510 NEXT I
1520 IF D1[7]>1 THEN GOTO 1540
1530 GOTO 1570
1540 LET A2=SQR(A2/(D1[7]-1))

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1550 PRINT FILE[3],"  STD.DEV      = ";
1560 PRINT FILE[3],USING U2$,A2
1570 LET D=1
1580 ON D1[3] THEN GOTO 1030, 1620, 1600, 2240, 1640, 1650, 1650
1590 GOTO 1030
1600 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
1610 GOTO 1650
1620 LET D=(D1[4]+D1[5])/D1[4]
1630 GOTO 1650
1640 LET D=(D2[4]+D2[5])/D2[4]
1650 IF D=1 THEN GOTO 1670
1660 PRINT FILE[3],"  DIL FACTOR       = ";D
1670 LET G3=G2*D
1680 PRINT FILE[3],">>>>RPT CONC (";I1$[12,14];")   = ";G3
1690 ON D1[3] THEN GOTO 1030, 1030, 1710, 2240, 2020, 2170, 2220
1700 GOTO 1030
1710 IF D2[7]<=0 THEN GOTO 1030
1720 LET S=D2[6]
1730 GOSUB 2720
1740 LET G4=C1*(D2[4]+D2[5])/D2[4]
1750 LET M=D1[4]*D1[5]
1760 IF D1[4]=0 THEN LET M=D1[5]
1770 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
1780 PRINT FILE[3],"    RPT CONC (";I2$[12,14];")   = ";G4
1790 PRINT FILE[3],"    RPT SPIKE (LSA)  = ";G5
1800 IF G5=0 THEN GOTO 2010
1810 LET Q=(G3-G4)*100/G5
1820 PRINT FILE[3],"    % RECOVERY       = ";Q;"%"
1830 PRINT FILE[3],"    QC MESSAGE       > ";
1840 FOR J=1 TO 5
1850   IF D1[3]<>3 THEN GOTO 1880
1860   IF Q>D2[13+J] THEN GOTO 1910
1870   GOTO 1890
1880   IF Q>D1[13+J] THEN GOTO 1910
1890 NEXT J
1900 LET J=6
1910 ON J THEN GOTO 1920, 1940, 1960, 1960, 1980, 2000
1920 PRINT FILE[3],"****** OUT HIGH ******"
1930 GOTO 2010
1940 PRINT FILE[3],"*** WARN HIGH ***"
1950 GOTO 2010
1960 PRINT FILE[3],"QC OK"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1970 GOTO 2010
1980 PRINT FILE[3],"*** WARN LOW ***"
1990 GOTO 2010
2000 PRINT FILE[3],"****** OUT LOW ******"
2010 GOTO 1030
2020 IF D2[7]<=0 THEN GOTO 1030
2030 LET S=D2[6]
2040 GOSUB 2720
2050 LET G4=C1*D
2060 PRINT FILE[3],"    RPT CONC (";I2$[12,14];")   = ";G4
2070 LET X=(G3+G4)/2
2080 PRINT FILE[3],"    XBAR (AVE)       = ";X
2090 LET R9=ABS(G3-G4)
2100 PRINT FILE[3],"    R (CRIT DIFF)    = ";R9
2110 PRINT FILE[3],"    QC MESSAGE       > ";
2120 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 2150
2130 PRINT FILE[3],"QC OK!"
2140 GOTO 2160
2150 PRINT FILE[3],"OUT OF CONTROL ******"
2160 GOTO 1030
2170 PRINT FILE[3],"    THEOR CONC (LCT) = ";D1[5]
2180 IF D1[5]=0 THEN GOTO 2210
2190 LET Q=100*G3/D1[5]
2200 PRINT FILE[3],"    % RECOVERY       = ";Q;"%"
2210 GOTO 1830
2220 LET Q=G3
2230 GOTO 1830
2240 IF D2[7]<=0 THEN GOTO 1030
2250 PRINT FILE[3]
2260 PRINT FILE[3],"    ABS OF CHK STD   = ";D1[6]
2270 PRINT FILE[3],"    ABS OF CAL STD   = ";D2[6]
2280 IF D2[6]=0 THEN GOTO 1030
2290 LET Q=100*D1[6]/D2[6]
2300 PRINT FILE[3],"    % RECOVERY       = ";Q;"%"
2310 GOTO 1830
2320 CLOSE FILE[3]
2330 IF M5=3 THEN GOTO 2600
2340 IF M5=0 THEN GOTO 2520
2350 OPEN FILE[3,3],F3$,80
2360 GOTO 2400
2370 PRINT "X";
2380 IF SYS(7)<>-48 THEN STOP

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  7
                      PROGRAM LISTING FOR ISCN06.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2390 DELAY =2.3
2400 ON ERR THEN GOTO 2370
2410 OPEN FILE[6,1],"$LPT"
2420 ON ERR THEN STOP
2430 FOR I=1 TO 10000
2440   LREAD FILE[3],I$,I0$
2450   IF EOF(3)=1 THEN GOTO 2490
2460   LET I$=I$,I0$
2470   PRINT FILE[6],I$;
2480 NEXT I
2490 CLOSE FILE[6]
2500 CLOSE FILE[3]
2510 IF M5=1 THEN GOTO 2600
2520 OPEN FILE[3,3],F3$,80
2530 FOR I=1 TO 10000
2540   LREAD FILE[3],I$,I0$
2550   IF EOF(3)=1 THEN GOTO 2580
2560   PRINT I$;I0$;
2570 NEXT I
2580 PRINT
2590 CLOSE FILE[3]
2600 ON ERR THEN GOTO 2620
2610 CHAIN P2$
2620 ON ERR THEN STOP
2630 STOP
2640 REM [  READ/WRITE (.DF) SUBROUTINES   ]
2650 REM ************************************
2660 MAT READ FILE[1,W1],D1
2670 READ FILE[0,W1],I1$
2680 RETURN
2690 MAT READ FILE[1,W2],D2
2700 READ FILE[0,W2],I2$
2710 RETURN
2720 LET J0=M0+1
2730 IF J0=5 THEN GOTO 2820
2740 READ FILE[2,4+J0],N,P0,P1,P2,P3,P4,P5,P6
2750 IF P5=0 THEN GOTO 2800
2760 LET J0=J0-1
2770 IF J0>=1 THEN GOTO 2740
2780 LET C1=0
2790 RETURN
2800 LET C1=P1+S*(P2+S*(P3+S*P4))

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  8
                      PROGRAM LISTING FOR ISCN06.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2810 GOTO 2790
2820 READ FILE[2,5],N
2830 IF N<=1 THEN GOTO 2890
2840 FOR K=1 TO N-1
2850   READ FILE[2,19+K],R7,C7
2860   READ FILE[2,20+K],R8,C8
2870   IF S>=R7 THEN IF S<R8 THEN GOTO 2910
2880 NEXT K
2890 LET J0=1
2900 GOTO 2740
2910 LET C1=C7+((S-R7)*(C8-C7))/(R8-R7)
2920 RETURN
2930 NOESC
2940 READ FILE[2,15],M0,M1,R1,M2,M5,E5
2950 LET E5=E5+1
2960 WRITE FILE[2,15],M0,M1,R1,M2,M5,E5
2970 ESC
2980 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  9
                   SYMBOL TABLE FOR ISCN06.AS

SYMBOL    REFERENCES
------  --------------------------------------------------------------

 0470  0450
 0490  0480
 0520  0490
 0530  0510
 0770  0690
 0828  0836
 0838  0830
 0920  0890
 0960  0920
 0980  0950
 0990  0910
 1000  0850
 1010  0990
 1020  0486
 1030  1060  1220  1270  1380  1580  1590  1690  1700  1710  2010
       2020  2160  2240  2280
 1150  1120
 1170  1110
 1210  1150
 1220  1140  1160  1200
 1280  1250
 1330  1290  1300
 1360  1330
 1370  1320  1350
 1390  1370
 1540  1520
 1570  1530
 1600  1580
 1620  1580
 1640  1580
 1650  1580  1610  1630
 1670  1650
 1710  1690
 1830  2210  2230  2310
 1880  1850
 1890  1870
 1910  1860  1880
 1920  1910
 1940  1910
 1960  1910
 1980  1910
 2000  1910
 2010  1800  1930  1950  1970  1990
 2020  1690
 2150  2120
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE 10
                   SYMBOL TABLE FOR ISCN06.AS

SYMBOL    REFERENCES
------  --------------------------------------------------------------

 2160  2140
 2170  1690
 2210  2180
 2220  1690
 2240  1280  1580  1690
 2320  1040
 2370  2400
 2400  2360
 2490  2450
 2520  2340
 2580  2550
 2600  2330  2510
 2620  2600
 2660  0840  1050
 2690  1170
 2720  1410  1480  1730  2040
 2740  2770  2900
 2790  2810
 2800  2750
 2820  2730
 2890  2830
 2910  2870
 2930  0070
 A1    1490  1500
 A1$   0100  0560  0570  0580  0590  0600  0610
 A2    1390  1500  1540  1560
 B0    0250
 C     0930  0960  0970  0980
 C$    0260
 C0$   0140
 C1    1420  1490  1740  1770  2050  2780  2800  2910
 C7    2850  2910
 C8    2860  2910
 D     1570  1600  1620  1640  1650  1660  1670  2050
 D0$   0100  0120  0180  0220  0400
 D1    2660
 D1[   0110  0850  0890  0930  0960  0970  0980  1060  1090  1100
       1220  1230  1240  1250  1280  1290  1300  1330  1400  1460
       1470  1520  1540  1580  1600  1620  1690  1750  1760  1770
       1850  1880  2170  2180  2190  2260  2290
 D2    2690
 D2[   0110  1180  1600  1640  1710  1720  1740  1770  1860  2020
       2030  2120  2240  2270  2280  2290
 E5    0280  2940  2950  2960
 F$    0120  0820  0826  0834  0980
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE 11
                    SYMBOL TABLE FOR ISCN06.AS

SYMBOL    REFERENCES
------  ---------------------------------------------------------------------
 F3$    0230  0290  2350  2520
 F6$    0240
 F7$    0180  0220  0380
 FL#0   2670  2700
 FL#1   2660  2690
 FL#2   0180  0220  0250  0260  0270  0280  0440  0500  0520  2740
        2820  2850  2860  2940  2960
 FL#3   0290  0300  0310  0320  0330  0340  0350  0360  0370  0380
        0390  0400  0410  0420  0460  0530  0540  0550  0610  0620
        0630  0640  0650  0660  0670  0680  0710  0760  0770  0780
        0790  0800  0810  0870  0880  0900  0980  1010  1070  1080
        1090  1130  1180  1190  1210  1230  1240  1260  1310  1340
        1360  1430  1440  1450  1550  1560  1660  1680  1780  1790
        1820  1830  1920  1940  1960  1980  2000  2060  2080  2100
        2110  2130  2150  2170  2200  2250  2260  2270  2300  2320
        2350  2440  2500  2520  2540  2590
 FL#6   2410  2470  2490
 G2     1420  1440  1500  1670
 G3     1670  1680  1810  2070  2090  2190  2220
 G4     1740  1780  1810  2050  2060  2070  2090
 G5     1770  1790  1800  1810
 I      0430  0440  0470  1460  1470  1510  2430  2480  2530  2570
 I$     0100  2440  2460  2470  2540  2560
 I0$    2440  2460  2540  2560
 I1$    0090  0880  1090  1680  2670
 I2$    0090  1780  2060  2700
 J      1840  1860  1880  1890  1900  1910
 J0     1450  2720  2730  2740  2760  2770  2890
 K      2840  2850  2860  2880
 K$     0120
 K0     0260  0480  1060  1370
 L3     0824  0826  0832  0834
 L4     0822  0824  0828  0830  0832
 M      1750  1760  1770
 M0     0280  0490  0520  0560  0570  0580  0590  0600  0690  0700
        0920  2720  2940  2960
 M0$    0090  0130  1450
 M1     0280  2940  2960
 M2     0280  2940  2960
 M5     0280  2330  2340  2510  2940  2960
 M9     0520
 N      0500  0520  0630  2740  2820  2830  2840
 N1     0260
 P$     0180  0190  0200  0210  0220  0230  0240
 P0     2740
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE 12
                    SYMBOL TABLE FOR ISCN06.AS

SYMBOL    REFERENCES
------  ---------------------------------------------------------------------
 P0$    0180  0190  0220
 P1     0520  0720  0960  2740  2800
 P1$    0180  0200  0220
 P2     0520  0730  0960  2740  2800
 P2$    0180  0210  0220  2610
 P3     0520  0740  0960  2740  2800
 P4     0520  0750  0960  2740  2800
 P5     0520  2740  2750
 P6     0520  0660  2740
 P[     0110
 Q      1810  1820  1860  1880  2190  2200  2220  2290  2300
 R      0260
 R0     0250
 R0$    0180  0220  0390
 R1     0280  2940  2960
 R1$    0270  0350
 R2$    0270  0360
 R3$    0270  0370
 R4$    0120  0270  0330
 R7     2850  2870  2910
 R8     2860  2870  2910
 R9     0940  0970  0980  2090  2100  2120
 S      1400  1470  1720  2030  2800  2870  2910
 S0     0250  0990
 S0$    0090  0150  0160  0170  1090  1180
 S1     0860  0990
 S1$    0090  0440  0450  0460
 S9     0250
 T0     0250
 T9     0700  0710
 U0     0250
 U1$    0260  0482  0824  0826  1240
 U2$    0260  0484  0832  0834  1440  1560
 W      0260
 W0     0250  0838  1040
 W1     0838  0870  1000  1020  1030  1040  1080  1110  2660  2670
 W2     1100  1110  1120  1150  1190  2690  2700
 X      2070  2080  2120
 X0     0260  1300
 X9     0260  1330
 Y0     0250  0670
 Y9     0250  0640
```

TYPING GUIDE SHEET

SECTION 10

ISCN.07 - THE FINISH COMMAND ROUTER

Finish Command Level (FCL) is level 3 of the standard calibration system. It is accessed from the ISCN.04 program with the '3' command. All functions of the FCL are performed in the ISCN.07 program which is depicted in Figure 12. The program performs four major functions from the command line including method limit modification, reagent blank subtraction, Run Results File generation (SFC), and Final Report generation (non-SFC). The notable aspects of each module will be explained in this section along with a description of the major subroutines.

The method limit modification module utilizes default parameters equal to the lowest (Y0) and highest (Y9) non-zero standards. The new limits can not be negative. Once the new limits have been verified, they actually replace the high/low standard values in the transfer file. The new limits will be used in subsequent report generation sessions to qualify concentrations reported by the system. The limits will have no affect on off-scale determinations made during sample measurement or interim report generation sessions since these situations are governed by the absorbance values recorded for standard samples.

The reagent blank absorbance subtraction routine has the following default scheme for wheel position. The initial defaults are the first and last positions in the wheel. If the stopping position (W6) is less than the last sample in the wheel, then the next time the routine is accessed the starting position (W5) will be the position after the last stopping position (ie. W5 = W6 + 1). The actual reagent-absorbance value is written into sample array location D1(23).

The production of the Run Results File in the ISCN.07 program is complicated by the fact that either a Run File (.RF) or a previously filled Run Results File (.RR) may be used as the basis for the operation. The program uses the RENAME convention to determine whether the Run File or the Run Results File is active. If the Run Results File exists, it is RENAMEd to a Run File. The process of filling the Run File is then started.

The first step in filling the Run File is to load the header record with a new Run Results File identifier. This identifier will contain the date and time of file formation. The date code (D0$) is also changed in the transfer file. This variable is extremely important since it is checked against the Run Results File header record in the ISCN.00 program in order to determine if direct entry to the IRCL is allowed from the ASCL. (See Section 3 above.)

After the date code is modified, each Run File record is read, data fields are nulled, and new data is formatted and stored into the appropriate fields. The two fields of interest are the results field (I$(28,37)) and the quality control or results qualifier field (I$(48,50)). The results field is formed by passing a number representing absorbance or concentration to the number formatting subroutine. The formatting subroutine returns a ten figure string defining the number in scientific notation. This string is then imbedded in the Run File record. If no result is available, then the field will remain blank. The result qualifier field is filled only if the sample determination is out of bounds. A limit violation on the sample will cause the program to write the "BDL" or "GTL" limit qualifier into the result qualifier field.

As result fields are filled, the records are written into a temporary Run Results File (.RT). When the process is complete, this temporary file will become the Run Results File through a RENAME, and the original Run File will be deleted. Notice that a cleanup routine is provided in case ESCape is hit during Run Results File creation. If a non-SFC standard Run File (0000000.RF) is being used, it will not be allowed to retain the .RR extension. This will protect the SFC system from having to deal with a file which is incompatible with SFC.

The Final Report generator has been included in this program for analysts not affiliated with the SFC system. The report is generated in a similar manner to the interim report, however, much less information is included. The report itself is generated to a list file (ISCN.LF) which in turn is output to the preselected output device. The actual results need not appear in scientific notation since numbers from 1 to 99,999 will appear in regular floating point form with padded zeros.

The results formatter subroutine is of interest since it was written to circumvent certain problems inherent in Basic. Note that the integers 1 and 10 cannot be checked directly, but must be referenced against 0.9995 and 9.9995 respectively. Once the exponential has been decoded and the mantissa has been located between one and ten, rounding is performed. The exponent and mantissa fields are filled and the string (N$) is returned to the main routine.

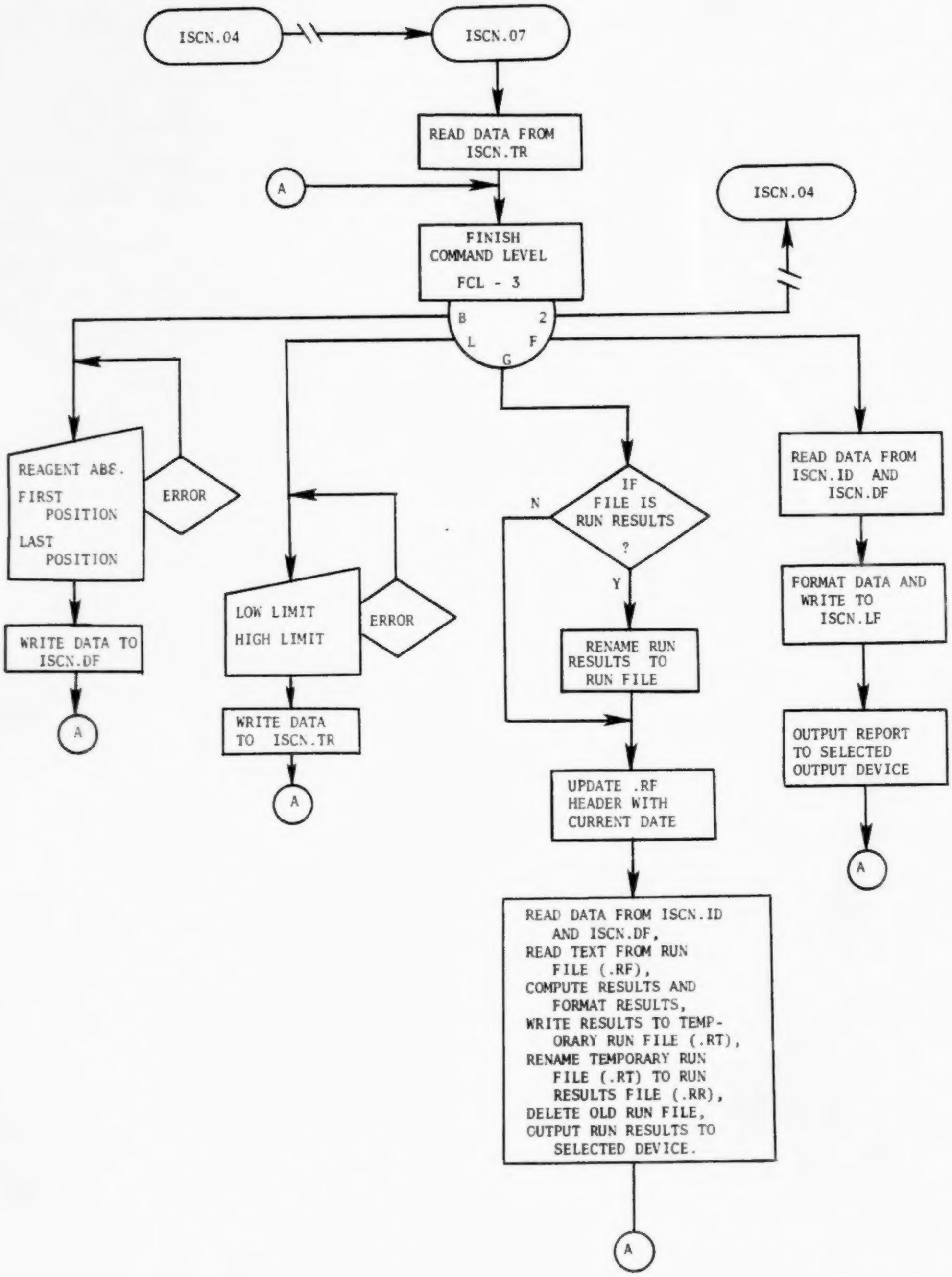
ISCN.04
ISCN.07
READ DATA FROM ISCN.TR
A
ISCN.04
FINISH COMMAND LEVEL FCL - 3
B
2
L
G
F
REAGENT ABS. FIRST POSITION LAST POSITION
ERROR
WRITE DATA TO ISCN.DF
A
LOW LIMIT HIGH LIMIT
ERROR
WRITE DATA TO ISCN.TR
A
IF FILE IS RUN RESULTS ?
N
Y
RENAME RUN RESULTS TO RUN FILE
UPDATE .RF HEADER WITH CURRENT DATE
READ DATA FROM ISCN.ID AND ISCN.DF, READ TEXT FROM RUN FILE (.RF), COMPUTE RESULTS AND FORMAT RESULTS, WRITE RESULTS TO TEMPORARY RUN FILE (.RT), RENAME TEMPORARY RUN FILE (.RT) TO RUN RESULTS FILE (.RR), DELETE OLD RUN FILE, OUTPUT RUN RESULTS TO SELECTED DEVICE.
A
READ DATA FROM ISCN.ID AND ISCN.DF
FORMAT DATA AND WRITE TO ISCN.LF
OUTPUT REPORT TO SELECTED OUTPUT DEVICE
A

Figure 12. Program ISCN.07 -- Finish Command Level router.

TABLE 13. SYMBOL DEFINITIONS FOR ISCN.07

A$	a user response to a prompt (character)
A1$	the default value string
A2$	a user response to a prompt (numeric)
B	the reagent blank absorbance
B0	the number of reagent blanks in the wheel pattern
C$	the current IRCL command string
C1	the computed sample concentration
C7	an interpolation parameter - the low concentration
C8	an interpolation parameter - the high concentration
D	the dilution factor
D0$	the date code of the Run File
D1(	the data array for the current sample
D2(	the data array for the primary QC member
E	the exponent counter for the number formatter
E5	the ESCape counter
F3$	the name of an output list file
F6$	the name of the temporary Run Results File (.RT)
F7$	the name of the Run File (.RF)
F8$	the name of the Run Results File (.RR)
G2	the computed concentration of a sample
G3	the reportable concentration of a sample
G4	the reported value for the primary QC member
G5	the reported value for the spike
I	a counter
I$	a list file record
I0$	a list file record delimiter
I1$	the current sample identifier string
I2$	the identifier string of the primary QC member
I3$	the Run File date code modifier string
J	a counter
J0	the computation mode locator
K0	the calibration flag
L2	a string placement variable
M	the mass of a spike
M0	the computation mode flag
M5	the output report mode flag
N	a number requiring string conversion (N to N$)
N$	a string formatted number (N to N$)
N1$	the mantissa of the formatted number
N2$	the characteristic (exponent) of the formatted number
P$	the prefix to program and data files
P0	a dummy variable
P0$	the previous program (.04)

TABLE 13. (Contd.)

P1	a regression equation coefficient
P1$	the current program (.07)
P2	a regression equation coefficient
P2$	the program to be CHAINed to (.04)
P3	a regression equation coefficient
P4	a regression equation coefficient
P5	the equation acceptability falg
P6	the fitting error for a regression equation
Q	the QC acceptability value
R$	the Run File prefix
R0	the number of reagent blanks in the wheel pattern
R0$	the PARMETH code for the Run File
R1$	the analyst's initial string
R2$	the analyte identifier string
R3$	the concentration units string
R4$	the instrument name string
R5	the Run File record counter
R7	an interpolation parameter - the low absorbance
R8	an interpolation parameter - the high absorbance
R9	the difference between duplicates
S	the absorbance of a sample
S0	the number of calibration standards in the wheel pattern
S9	the position at which calibration occurs
T0	the number of timing set standards in a wheel pattern
U$	the general purpose format string
U0	the number of unknowns in the wheel pattern
U1$	the format string variable
W0	the number of samples in the wheel pattern
W1	the current wheel position
W2	the position of the primary QC member
W5	the starting wheel position for reagent subtraction
W6	the stopping wheel position for reagent subtraction
X	the duplicate mean
Y0	the lowest (non-zero) calibration standard concentration
Y1	the user-supplied minimum concentration
Y8	the user-supplied maximum concentration
Y9	the highest calibration standard concentration

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  1
                    PROGRAM LISTING FOR ISCN07.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.07 - FINISH/APPROVE PROGRAM; CREATES RUN  *
0040 REM *            RESULTS FILE FOR SFC OR NON-SFC FINAL REPORT   *
0050 REM *   BY D.RYAN (UCCC), OCTOBER 30, 1979                      *
0060 REM *   MOST RECENT REVISION: APRIL 24, 1980                    *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 NOESC
0090 DIM I1$[15],I2$[15],I$[80],F6$[13],F7$[13],F8$[15],N$[10]
0092 DIM F3$[13]
0100 DIM D1[25],D2[25],Q2[5],R4$[16]
0110 DIM D0$[20],I3$[20],U$[70],U1$[20]
0120 LET N$="          "
0130 LET W1=0
0140 LET W2=0
0150 LET R5=1
0160 LET A1=0
0170 LET A2=1
0180 LET B=0
0190 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0200 LET P0$=P$,".04"
0210 LET P1$=P$,".07"
0220 LET P2$=P$,".04"
0230 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0240 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0250 READ FILE[2,3],Q2[1],Q2[2],Q2[3],Q2[4],Q2[5],Q0,Q1
0260 READ FILE[2,4],C$,W,R,K0,X0,X9,N1,U1$,U2$
0270 READ FILE[2,9],R1$,R2$,R3$,R4$
0280 READ FILE[2,15],M0,M1,R1,M2,M5,E5
0290 LET W5=1
0300 LET W6=W0
0310 LET A2$=""
0320 ON ESC THEN GOTO 0320
0330 ESC
0340 ON ERR THEN STOP
0350 PRINT
0360 PRINT "FINISH COMMAND LEVEL OPTIONS ([H]LBGF2) ";
0370 ON ERR THEN GOTO 5460
0380 INPUT "> ",A$;
0390 ON ERR THEN STOP
0400 PRINT
0410 REM *****  THESE LINES MAY BE REMOVED FOR NON-ENTRY TO BCL  *****

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  2
                    PROGRAM LISTING FOR ISCN07.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0420 IF A$<>"DPR" THEN GOTO 0450
0430 ESC
0440 STOP
0450 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 0520
0460 PRINT "   L - MODIFY BDL/GTL LIMITS"
0470 PRINT "   B - REAGENT BLANK ABSORBANCE SUBTRACTION"
0480 PRINT "   G - GENERATE RUN RESULTS FILE (SFC)"
0490 PRINT "   F - OUTPUT FINAL REPORT (NON-SFC)"
0500 PRINT "   2 - EXIT TO ISCL(2)"
0510 GOTO 0350
0520 IF LEN(A$)<>1 THEN GOTO 0540
0530 ON POS("LBGF2",A$,1) THEN GOTO 0560, 0890, 1400, 3200, 4800
0540 PRINT "<7>";
0550 GOTO 0320
0560 LET A2$=""
0570 LET Y8=Y9
0580 LET Y1=Y0
0590 PRINT
0600 LET A1$=STR$(Y1)
0610 GOTO 0630
0620 PRINT "<7>";
0630 PRINT "LOWER CONCENTRATION LIMIT [";A1$;R3$;"] ";
0640 ON ERR THEN GOTO 5460
0650 INPUT "> ",A2$;
0660 ON ERR THEN GOTO 0620
0670 PRINT
0680 IF LEN(A2$)=0 THEN LET A2$=A1$
0690 LET Y1=VAL(A2$)
0700 ON ERR THEN STOP
0710 LET A1$=STR$(Y8)
0720 GOTO 0740
0730 PRINT "<7>";
0740 PRINT "UPPER CONCENTRATION LIMIT [";A1$;R3$;"] ";
0750 ON ERR THEN GOTO 5460
0760 INPUT "> ",A2$;
0770 ON ERR THEN GOTO 0730
0780 PRINT
0790 IF LEN(A2$)=0 THEN LET A2$=A1$
0800 LET Y8=VAL(A2$)
0810 ON ERR THEN STOP
0820 IF Y1>=0 THEN IF Y8>=0 THEN IF Y8>Y1 THEN GOTO 0850
0830 PRINT "<7>";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0840 GOTO 0560
0850 LET Y0=Y1
0860 LET Y9=Y8
0870 WRITE FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0880 GOTO 0320
0890 PRINT
0900 GOTO 0920
0910 PRINT "<7>";
0920 PRINT "REAGENT BLANK ABSORBANCE ([CR] TO EXIT) ";
0930 ON ERR THEN GOTO 5460
0940 INPUT " > ",A2$;
0950 ON ERR THEN GOTO 0910
0960 PRINT
0970 IF LEN(A2$)=0 THEN GOTO 0320
0980 LET B=VAL(A2$)
0990 ON ERR THEN STOP
1000 LET A1$=STR$(W5)
1010 GOTO 1030
1020 PRINT "<7>";
1030 PRINT "STARTING WHEEL POSITION [";A1$;"] ";
1040 ON ERR THEN GOTO 5460
1050 INPUT "> ",A2$;
1060 ON ERR THEN GOTO 1020
1070 PRINT
1080 IF LEN(A2$)=0 THEN LET A2$=A1$
1090 LET W5=VAL(A2$)
1100 ON ERR THEN STOP
1110 LET A1$=STR$(W6)
1120 GOTO 1140
1130 PRINT "<7>";
1140 PRINT "STOPPING WHEEL POSITION [";A1$;"] ";
1150 ON ERR THEN GOTO 5460
1160 INPUT "> ",A2$;
1170 ON ERR THEN GOTO 1130
1180 PRINT
1190 IF LEN(A2$)=0 THEN LET A2$=A1$
1200 LET W6=VAL(A2$)
1210 ON ERR THEN STOP
1220 IF W5>=1 THEN IF W5<=W0 THEN GOTO 1240
1230 GOTO 1280
1240 IF W6>=1 THEN IF W6<=W0 THEN GOTO 1260
1250 GOTO 1280

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1260 IF W5<=W6 THEN GOTO 1320
1270 PRINT
1280 PRINT "<7>WHEEL POSITION ERROR!<7>"
1290 LET W5=1
1300 LET W6=W0
1310 GOTO 1000
1320 FOR W1=W5 TO W6
1330   GOSUB 5160
1340   LET D1[23]=B
1350   GOSUB 5220
1360 NEXT W1
1370 IF W6<W0 THEN LET W5=W6+1
1380 LET W6=W0
1390 GOTO 0890
1400 LET R$=F7$[1,LEN(F7$)-3]
1410 LET F6$=R$,".RT"
1420 LET F8$=R$,".RR"
1430 ON ERR THEN GOTO 1450
1440 RENAME F7$,F7$
1450 ON ERR THEN STOP
1460 IF SYS(7)=-9 THEN GOTO 1610
1470 ON ERR THEN GOTO 1490
1480 RENAME F8$,F8$
1490 ON ERR THEN STOP
1500 IF SYS(7)=-9 THEN GOTO 1520
1510 STOP
1520 NOESC
1530 RENAME F8$,F7$
1540 GOTO 1610
1550 NOESC
1560 ON ERR THEN GOTO 1580
1570 CLOSE FILE[7]
1580 ON ERR THEN GOTO 1600
1590 CLOSE FILE[6]
1600 GOTO 0320
1610 ON ESC THEN GOTO 1550
1620 ESC
1630 LET R5=1
1640 LET W1=0
1650 OPEN FILE[7,3],F7$,80
1660 OPEN FILE[6,1],F6$,80
1670 LREAD FILE[7],I$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN07.AS

```
12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
1680 IF EOF(7)=1 THEN GOTO 2680
1690 LET I3$="1 00 00 00 00 00 "
1700 LET I3$[5-LEN(STR$(SYS(3)-1900)),4]=STR$(SYS(3)-1900)
1710 LET I3$[8-LEN(STR$(SYS(2))),7]=STR$(SYS(2))
1720 LET I3$[11-LEN(STR$(SYS(1))),10]=STR$(SYS(1))
1730 LET I3$[14-LEN(STR$(SYS(11))),13]=STR$(SYS(11))
1740 LET I3$[17-LEN(STR$(SYS(12))),16]=STR$(SYS(12))
1750 LET D0$=I3$[3,4],"/",I3$[6,7],"/",I3$[9,13],":",I3$[15,16]
1760 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
1770 LET I$[1,16]=I3$[1,16]
1780 PRINT FILE[6],I$
1790 LET W1=W1+1
1800 IF W1>W0 THEN GOTO 2680
1810 GOSUB 5160
1820 LET R5=R5+1
1830 LREAD FILE[7],I$
1840 IF EOF(7)=1 THEN GOTO 2680
1850 IF D1[1]=R5 THEN GOTO 1880
1860 PRINT FILE[6],I$
1870 GOTO 1820
1880 LET I$[28,37]="          "
1890 LET I$[48,50]="   "
1900 IF D1[7]=0 THEN GOTO 1980
1910 FOR I=0 TO 3
1920   IF D1[3]=I*I THEN GOTO 1950
1930 NEXT I
1940 GOTO 2000
1950 LET N=D1[6]
1960 GOSUB 4860
1970 LET I$[28,37]=N$
1980 PRINT FILE[6],I$
1990 GOTO 1790
2000 IF D1[2]<=0 THEN GOTO 2050
2010 LET W2=D1[2]
2020 GOSUB 5190
2030 REM *** IF NO ORIGINAL WAS RUN THEN DON'T REPORT CONC.
2040 IF D2[7]=0 THEN GOTO 1980
2050 LET S=D1[6]
2060 IF D1[3]<>6 THEN IF D1[3]<>7 THEN LET S=S-D1[23]
2070 GOSUB 5250
2080 IF D1[3]=7 THEN GOTO 2100
2090 IF C1<Y0 THEN LET I$[48,50]="BDL"

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN07.AS

```
12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
2100 IF C1>Y9 THEN LET I$[48,50]="GTL"
2110 LET G2=C1
2120 LET D=1
2130 ON D1[3] THEN GOTO 1980, 2170, 2150, 1980, 2190, 2200, 2200
2140 GOTO 1980
2150 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
2160 GOTO 2200
2170 LET D=(D1[4]+D1[5])/D1[4]
2180 GOTO 2200
2190 LET D=(D2[4]+D2[5])/D2[4]
2200 LET G3=G2*D
2202 LET I$[39,38+LEN(R3$)]=R3$
2210 LET N=G3
2220 GOSUB 4860
2230 ON D1[3] THEN GOTO 1980, 1970, 2250, 1980, 2530, 2630, 2660
2240 GOTO 1980
2250 LET S=D2[6]-D2[23]
2260 GOSUB 5250
2270 LET G4=C1*(D2[4]+D2[5])/D2[4]
2280 LET M=D1[4]*D1[5]
2290 IF D1[4]=0 THEN LET M=D1[5]
2300 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
2310 IF G5=0 THEN GOTO 1980
2320 LET Q=(G3-G4)*100/G5
2330 FOR J=1 TO 5
2340   IF D1[3]<>3 THEN GOTO 2370
2350   IF Q>D2[13+J] THEN GOTO 2400
2360   GOTO 2380
2370   IF Q>D1[13+J] THEN GOTO 2400
2380 NEXT J
2390 LET J=6
2400 ON J THEN GOTO 2410, 2430, 2430, 2430, 2430, 2410
2410 IF I$[48,50]<>"   " THEN GOTO 2430
2420 REM LET I$[48,50]="FQC"
2430 IF D1[3]=3 THEN GOTO 2450
2440 GOTO 1970
2450 LET I$[28,37]=N$
2460 PRINT FILE[6],I$
2470 LET R5=R5+1
2480 LREAD FILE[7],I$
2490 IF EOF(7)=1 THEN GOTO 2680
2492 LET I$[39,38+LEN(R3$)]=R3$

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2500 LET N=G5
2510 GOSUB 4860
2520 GOTO 1970
2530 LET S=D2[6]-D2[23]
2540 GOSUB 5250
2550 LET G4=C1*D
2560 LET X=(G3+G4)/2
2570 LET R9=ABS(G3-G4)
2580 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 2600
2590 GOTO 2620
2600 IF I$[48,50]<>"   " THEN GOTO 2620
2610 REM LET I$[48,50]="FQC"
2620 GOTO 1970
2630 IF D1[5]=0 THEN GOTO 2650
2640 LET Q=100*G3/D1[5]
2650 GOTO 2330
2660 LET Q=G3
2670 GOTO 2330
2680 CLOSE FILE[6]
2690 CLOSE FILE[7]
2700 NOESC
2710 RENAME F6$,F8$
2720 DELETE F7$
2730 ON ESC THEN GOTO 2760
2740 ESC
2750 GOTO 2850
2760 ON ERR THEN GOTO 2780
2770 CLOSE FILE[6]
2780 ON ERR THEN GOTO 2800
2790 CLOSE FILE[3]
2800 ON ERR THEN STOP
2810 NOESC
2820 IF F7$<>"0000000.RF" THEN GOTO 0320
2830 RENAME F8$,F7$
2840 GOTO 0320
2850 LET F3$=F8$
2860 IF M5=3 THEN GOTO 3190
2870 IF M5=0 THEN GOTO 3090
2880 OPEN FILE[3,3],F3$,80
2890 GOTO 2930
2900 PRINT "X";
2910 IF SYS(7)<>-48 THEN STOP

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2920 DELAY =2.3
2930 ON ERR THEN GOTO 2900
2940 OPEN FILE[6,1],"$LPT"
2950 ON ERR THEN STOP
2960 PRINT
2970 PRINT "RUN RESULTS BEING OUTPUT TO LINEPRINTER."
2980 PRINT FILE[6]
2990 PRINT FILE[6],"RUN RESULTS FILE ";F3$;"   ";SYS(11);":";SYS(12);"
*         ";SYS(2);"/";SYS(1);"/";SYS(3)
3000 PRINT FILE[6]
3010 FOR I=1 TO 1000
3020   LREAD FILE[3],I$,I0$
3030   IF EOF(3)=1 THEN GOTO 3060
3040   PRINT FILE[6],I$
3050 NEXT I
3060 CLOSE FILE[6]
3070 CLOSE FILE[3]
3080 IF M5=1 THEN GOTO 3190
3090 OPEN FILE[3,3],F3$,80
3100 PRINT
3110 PRINT "RUN RESULTS FILE ";F3$;"   ";SYS(11);":";SYS(12);"   ";SYS
*     (2);"/";SYS(1);"/";SYS(3)
3120 PRINT
3130 FOR I=1 TO 1000
3140   LREAD FILE[3],I$,I0$
3150   IF EOF(3)=1 THEN GOTO 3180
3160   PRINT I$[1,72]
3170 NEXT I
3180 CLOSE FILE[3]
3190 GOTO 2810
3200 ON ESC THEN GOTO 4640
3210 ESC
3220 LET F3$=P$,".LF"
3230 OPEN FILE[3,1],F3$
3240 PRINT FILE[3]
3250 PRINT FILE[3], TAB(12);"FLAMELESS AA STANDARD CALIBRATION FINAL R
*     EPORT"
3260 PRINT FILE[3]
3270 PRINT FILE[3], TAB(5);"INSTRUMENT: ";R4$; TAB(38);
3280 PRINT FILE[3],USING "DATE: ##/##/####  ##:##",SYS(2),SYS(1),SYS(3
*     ),SYS(11),SYS(12)
3290 PRINT FILE[3], TAB(5);"ANALYST: ";R1$; TAB(38);

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN07.AS

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
 3300 PRINT FILE[3],"ANALYTE: ";R2$
 3310 PRINT FILE[3], TAB(5);"UNITS: ";R3$; TAB(38);
 3320 PRINT FILE[3],"RUN FILE NAME: ";F7$
 3330 PRINT FILE[3], TAB(5);"PARMETH CODE: ";R0$; TAB(38);
 3340 PRINT FILE[3],"RF CREATED: ";D0$[4,8];"/";D0$[1,2];D0$[9,14]
 3350 PRINT FILE[3]
 3360 PRINT FILE[3]," WHEEL      SAMPLE           SAMPLE        KNOWN SPIK
*     E   VIOLATION"
 3370 PRINT FILE[3],"  POS     IDENTIFIER    CONCENTRATION   OR  CONTRO
*     L   LIMIT      QC"
 3380 PRINT FILE[3]
 3390 LET W1=0
 3400 GOTO 3420
 3410 PRINT FILE[3],U$
 3420 LET W1=W1+1
 3430 IF W1>W0 THEN GOTO 4230
 3440 GOSUB 5160
 3450 FOR I=0 TO 3
 3460   IF D1[3]=I*I THEN GOTO 3420
 3470 NEXT I
 3480 LET U$="
*             "
 3490 LET U$[5-LEN(STR$(W1)),4]=STR$(W1)
 3500 LET U$[10,21]=I1$[3,14]
 3510 IF D1[7]=0 THEN GOTO 3410
 3520 IF D1[2]<=0 THEN GOTO 3560
 3530 LET W2=D1[2]
 3540 GOSUB 5190
 3550 IF D2[7]=0 THEN GOTO 3410
 3560 LET S=D1[6]
 3570 IF D1[3]<>6 THEN IF D1[3]<>7 THEN LET S=S-D1[23]
 3580 GOSUB 5250
 3590 IF D1[3]=7 THEN GOTO 3610
 3600 IF C1<Y0 THEN LET U$[56,58]="BDL"
 3610 IF C1>Y9 THEN LET U$[56,58]="GTL"
 3620 LET G2=C1
 3630 LET D=1
 3640 ON D1[3] THEN GOTO 3420, 3680, 3660, 3420, 3700, 3710, 3710
 3650 GOTO 3420
 3660 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
 3670 GOTO 3710
 3680 LET D=(D1[4]+D1[5])/D1[4]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN07.AS

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3690 GOTO 3710
3700 LET D=(D2[4]+D2[5])/D2[4]
3710 LET G3=G2*D
3720 LET N=G3
3730 GOSUB 4700
3740 LET L2=31-INT(LEN(N$)/2)
3750 LET U$[L2,L2+LEN(N$)-1]=N$
3760 ON D1[3] THEN GOTO 3420, 3410, 3780, 3420, 4040, 4140, 4210
3770 GOTO 3420
3780 LET S=D2[6]-D2[23]
3790 GOSUB 5250
3800 LET G4=C1*(D2[4]+D2[5])/D2[4]
3810 LET M=D1[4]*D1[5]
3820 IF D1[4]=0 THEN LET M=D1[5]
3830 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
3840 IF G5=0 THEN GOTO 3410
3850 LET N=G5
3860 GOSUB 4700
3870 LET L2=46-INT(LEN(N$)/2)
3880 LET U$[L2,L2+LEN(N$)-1]=N$
3890 LET Q=(G3-G4)*100/G5
3900 FOR J=1 TO 5
3910   IF D1[3]<>3 THEN GOTO 3940
3920   IF Q>D2[13+J] THEN GOTO 3970
3930   GOTO 3950
3940   IF Q>D1[13+J] THEN GOTO 3970
3950 NEXT J
3960 LET J=6
3970 ON J THEN GOTO 3980, 4000, 4020, 4020, 4000, 3980
3980 LET U$[64,67]="OUTC"
3990 GOTO 4030
4000 LET U$[64,67]="WARN"
4010 GOTO 4030
4020 LET U$[64,67]=" OK "
4030 GOTO 3410
4040 LET S=D2[6]-D2[23]
4050 GOSUB 5250
4060 LET G4=C1*D
4070 LET X=(G3+G4)/2
4080 LET R9=ABS(G3-G4)
4090 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 4120
4100 LET U$[64,67]=" OK "

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
7/15/1981                                                      PAGE 11
                    PROGRAM LISTING FOR ISCN07.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4110 GOTO 4130
4120 LET U$[64,67]="OUTC"
4130 GOTO 3410
4140 IF D1[5]=0 THEN GOTO 4160
4150 LET Q=100*G3/D1[5]
4160 LET N=D1[5]
4170 GOSUB 4700
4180 LET L2=46-INT(LEN(N$)/2)
4190 LET U$[L2,L2+LEN(N$)-1]=N$
4200 GOTO 3900
4210 LET Q=G3
4220 GOTO 3900
4230 CLOSE FILE[3]
4240 ON ESC THEN GOTO 4270
4250 ESC
4260 GOTO 4330
4270 ON ERR THEN GOTO 4290
4280 CLOSE FILE[6]
4290 ON ERR THEN GOTO 4310
4300 CLOSE FILE[3]
4310 ON ERR THEN STOP
4320 GOTO 0320
4330 IF M5=3 THEN GOTO 4630
4340 IF M5=0 THEN GOTO 4550
4350 OPEN FILE[3,3],F3$
4360 GOTO 4400
4370 PRINT "X";
4380 IF SYS(7)<>-48 THEN STOP
4390 DELAY =2.3
4400 ON ERR THEN GOTO 4370
4410 OPEN FILE[6,1],"$LPT"
4420 ON ERR THEN STOP
4430 PRINT
4440 PRINT "FINAL REPORT BEING OUTPUT TO LINEPRINTER."
4450 PRINT FILE[6]
4460 FOR I=1 TO 1000
4470   LREAD FILE[3],I$,IO$
4480   IF EOF(3)=1 THEN GOTO 4520
4490   LET I$=I$,IO$
4500   PRINT FILE[6],I$;
4510 NEXT I
4520 CLOSE FILE[6]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD     CALIBRATION     INSTRUMENT     AUTOMATION     SYSTEM
7/15/1981                                                      PAGE 12
                    PROGRAM LISTING FOR ISCN07.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4530 CLOSE FILE[3]
4540 IF M5=1 THEN GOTO 4630
4550 OPEN FILE[3,3],F3$
4560 PRINT
4570 FOR I=1 TO 1000
4580   LREAD FILE[3],I$,IO$
4590   IF EOF(3)=1 THEN GOTO 4620
4600   PRINT I$;IO$;
4610 NEXT I
4620 CLOSE FILE[3]
4630 GOTO 0320
4640 NOESC
4650 ON ERR THEN GOTO 4670
4660 CLOSE FILE[6]
4670 ON ERR THEN GOTO 4690
4680 CLOSE FILE[3]
4690 GOTO 0320
4700 IF ABS(N)>99999 THEN GOTO 4860
4710 IF ABS(N)<.1 THEN GOTO 4860
4720 LET U1$=STR$(N)
4730 LET N$=U1$
4740 IF U1$[1,1]<>"-" THEN LET N$="+",U1$
4750 IF LEN(N$)>6 THEN GOTO 4790
4760 IF POS(N$,".",1)=0 THEN LET N$=N$,"."
4770 LET N$=N$,"0"
4780 GOTO 4750
4790 RETURN
4800 ON ERR THEN GOTO 4820
4810 CHAIN P2$
4820 ON ERR THEN STOP
4830 ESC
4840 STOP
4850 REM SUBROUTINE TO FORMAT KNOWN VALUES AS +#.###E+##
4860 LET E=0
4870 LET N$="+0.000E+00"
4880 IF N=0 THEN GOTO 5110
4890 REM GET SIGN OF NUMBER
4900 IF N<0 THEN LET N$[1,1]="-"
4910 LET N=ABS(N)
4920 REM IF LESS THAN 1 THEN MULTIPLY BY 10
4930 IF N<.9995 THEN GOTO 4950
4940 GOTO 5000

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
12345678911234567892123456789312345678941234567895123456789612345678997
         0         0         0         0         0         0         0
4950 LET N=N*10
4960 LET N$[8,8]="-"
4970 LET E=E+1
4980 GOTO 4930
4990 REM IF N>=10 THEN DIVIDE BY 10
5000 IF N<9.9995 THEN GOTO 5050
5010 LET N=N/10
5020 LET N$[8,8]="+"
5030 GOTO 4970
5040 REM ROUND UP AND FORMAT AS #.###
5050 LET N=N+5E-04
5060 LET N1$=STR$(N)
5070 IF LEN(N1$)>5 THEN LET N1$=N1$[1,5]
5080 LET N$[2,LEN(N1$)+1]=N1$
5090 GOTO 5110
5100 REM PUT IN EXPONENT FIELD
5110 LET N2$=STR$(E)
5120 LET N$[11-LEN(N2$),10]=N2$
5130 RETURN
5140 REM [  READ/WRITE (.DF) SUBROUTINES   ]
5150 REM ************************************
5160 MAT READ FILE[1,W1],D1
5170 READ FILE[0,W1],I1$
5180 RETURN
5190 MAT READ FILE[1,W2],D2
5200 READ FILE[0,W2],I2$
5210 RETURN
5220 MAT WRITE FILE[1,W1],D1
5230 WRITE FILE[0,W1],I1$
5240 RETURN
5250 LET J0=M0+1
5260 IF J0=5 THEN GOTO 5350
5270 READ FILE[2,4+J0],N,P0,P1,P2,P3,P4,P5,P6
5280 IF P5=0 THEN GOTO 5330
5290 LET J0=J0-1
5300 IF J0>=1 THEN GOTO 5270
5310 LET C1=0
5320 RETURN
5330 LET C1=P1+S*(P2+S*(P3+S*P4))
5340 GOTO 5320
5350 READ FILE[2,5],N
5360 IF N<=1 THEN GOTO 5420

12345678911234567892123456789312345678941234567895123456789612345678997
         0         0         0         0         0         0         0
```

```
12345678911234567892123456789312345678941234567895123456789612345678997
         0         0         0         0         0         0         0
5370 FOR I=1 TO N-1
5380   READ FILE[2,19+I],R7,C7
5390   READ FILE[2,20+I],R8,C8
5400   IF S>=R7 THEN IF S<R8 THEN GOTO 5440
5410 NEXT I
5420 LET J0=1
5430 GOTO 5270
5440 LET C1=C7+((S-R7)*(C8-C7))/(R8-R7)
5450 RETURN
5460 PRINT "<7> ";
5470 RETRY

12345678911234567892123456789312345678941234567895123456789612345678997
         0         0         0         0         0         0         0
```

```
     STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                    PAGE 15
                    SYMBOL TABLE FOR ISCN07.AS

SYMBOL   REFERENCES
------  -----------------------------------------------------------
 0320   0320  0550  0880  0970  1600  2820  2840  4320  4630  4690
 0350   0510
 0450   0420
 0520   0450
 0540   0520
 0560   0530  0840
 0620   0660
 0630   0610
 0730   0770
 0740   0720
 0850   0820
 0890   0530  1390
 0910   0950
 0920   0900
 1000   1310
 1020   1060
 1030   1010
 1130   1170
 1140   1120
 1240   1220
 1260   1240
 1280   1230  1250
 1320   1260
 1400   0530
 1450   1430
 1490   1470
 1520   1500
 1550   1610
 1580   1560
 1600   1580
 1610   1460  1540
 1790   1990
 1820   1870
 1880   1850
 1950   1920
 1970   2230  2440  2520  2620
 1980   1900  2040  2130  2140  2230  2240  2310
 2000   1940
 2050   2000
 2100   2080
 2150   2130
 2170   2130
 2190   2130
 2200   2130  2160  2180
 2250   2230
```

```
     STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                    PAGE 16
                    SYMBOL TABLE FOR ISCN07.AS

SYMBOL   REFERENCES
------  -----------------------------------------------------------
 2330   2650  2670
 2370   2340
 2380   2360
 2400   2350  2370
 2410   2400
 2430   2400  2410
 2450   2430
 2530   2230
 2600   2580
 2620   2590  2600
 2630   2230
 2650   2630
 2660   2230
 2680   1680  1800  1840  2490
 2760   2730
 2780   2760
 2800   2780
 2810   3190
 2850   2750
 2900   2930
 2930   2890
 3060   3030
 3090   2870
 3180   3150
 3190   2860  3080
 3200   0530
 3410   3510  3550  3760  3840  4030  4130
 3420   3400  3460  3640  3650  3760  3770
 3560   3520
 3610   3590
 3660   3640
 3680   3640
 3700   3640
 3710   3640  3670  3690
 3780   3760
 3900   4200  4220
 3940   3910
 3950   3930
 3970   3920  3940
 3980   3970
 4000   3970
 4020   3970
 4030   3990  4010
 4040   3760
 4120   4090
```

```
       STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE 17
                      SYMBOL TABLE FOR ISCN07.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------
 4130   4110
 4140   3760
 4160   4140
 4210   3760
 4230   3430
 4270   4240
 4290   4270
 4310   4290
 4330   4260
 4370   4400
 4400   4360
 4520   4480
 4550   4340
 4620   4590
 4630   4330  4540
 4640   3200
 4670   4650
 4690   4670
 4700   3730  3860  4170
 4750   4780
 4790   4750
 4800   0530
 4820   4800
 4860   1960  2220  2510  4700  4710
 4930   4980
 4950   4930
 4970   5030
 5000   4940
 5050   5000
 5110   4880  5090
 5160   1330  1810  3440
 5190   2020  3540
 5220   1350
 5250   2070  2260  2540  3580  3790  4050
 5270   5300  5430
 5320   5340
 5330   5280
 5350   5260
 5420   5360
 5440   5400
 5460   0370  0640  0750  0930  1040  1150
 A$     0380  0420  0450  0520  0530
 A1     0160
 A1$    0600  0630  0680  0710  0740  0790  1000  1030  1080  1110
        1140  1190
```

```
       STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE 18
                      SYMBOL TABLE FOR ISCN07.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------
A2      0170
A2$     0310  0560  0650  0680  0690  0760  0790  0800  0940  0970
        0980  1050  1080  1090  1160  1190  1200
B       0180  0980  1340
B0      0240  0870
C$      0260
C1      2090  2100  2110  2270  2300  2550  3600  3610  3620  3800
        3830  4060  5310  5330  5440
C7      5380  5440
C8      5390  5440
D       2120  2150  2170  2190  2200  2550  3630  3660  3680  3700
        3710  4060
D0$     0110  0190  0230  1750  1760  3340
D1      5160  5220
D1[     0100  1340  1850  1900  1920  1950  2000  2010  2050  2060
        2080  2130  2150  2170  2230  2280  2290  2300  2340  2370
        2430  2630  2640  3460  3510  3520  3530  3560  3570  3590
        3640  3660  3680  3760  3810  3820  3830  3910  3940  4140
        4150  4160
D2      5190
D2[     0100  2040  2150  2190  2250  2270  2300  2350  2530  2580
        3550  3660  3700  3780  3800  3830  3920  4040  4090
E       4860  4970  5110
E5      0280
F3$     0092  2850  2880  2990  3090  3110  3220  3230  4350  4550
F6$     0090  1410  1660  2710
F7$     0090  0190  0230  1400  1440  1530  1650  1760  2720  2820
        2830  3320
F8$     0090  1420  1480  1530  2710  2830  2850
FL#0    5170  5200  5230
FL#1    5160  5190  5220
FL#2    0190  0230  0240  0250  0260  0270  0280  0870  1760  5270
        5350  5380  5390
FL#3    2790  2880  3020  3070  3090  3140  3180  3230  3240  3250
        3260  3270  3280  3290  3300  3310  3320  3330  3340  3350
        3360  3370  3380  3410  4230  4300  4350  4470  4530  4550
        4580  4620  4680
FL#6    1590  1660  1780  1860  1980  2460  2680  2770  2940  2980
        2990  3000  3040  3060  4280  4410  4450  4500  4520  4660
FL#7    1570  1650  1670  1830  2480  2690
G2      2110  2200  3620  3710
G3      2200  2210  2320  2560  2570  2640  2660  3710  3720  3890
        4070  4080  4150  4210
G4      2270  2320  2550  2560  2570  3800  3890  4060  4070  4080
G5      2300  2310  2320  2500  3830  3840  3850  3890
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 19
                    SYMBOL TABLE FOR ISCN07.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------
  I       1910  1920  1930  3010  3050  3130  3170  3450  3460  3470
          4460  4510  4570  4610  5370  5380  5390  5410
  I$      0090  1670  1770  1780  1830  1860  1880  1890  1970  1980
          2090  2100  2202  2410  2450  2460  2480  2492  2600  3020
          3040  3140  3160  4470  4490  4500  4580  4600
  I0$     3020  3140  4470  4490  4580  4600
  I1$     0090  3500  5170  5230
  I2$     0090  5200
  I3$     0110  1690  1700  1710  1720  1730  1740  1750  1770
  J       2330  2350  2370  2380  2390  2400  3900  3920  3940  3950
          3960  3970
  J0      5250  5260  5270  5290  5300  5420
  K0      0260
  L2      3740  3750  3870  3880  4180  4190
  M       2280  2290  2300  3810  3820  3830
  M0      0280  5250
  M1      0280
  M2      0280
  M5      0280  2860  2870  3080  4330  4340  4540
  N       1950  2210  2500  3720  3850  4160  4700  4710  4720  4880
          4900  4910  4930  4950  5000  5010  5050  5060  5270  5350
          5360  5370
  N$      0090  0120  1970  2450  3740  3750  3870  3880  4180  4190
          4730  4740  4750  4760  4770  4870  4900  4960  5020  5080
          5120
  N1      0260
  N1$     5060  5070  5080
  N2$     5110  5120
  P$      0190  0200  0210  0220  0230  1760  3220
  P0      5270
  P0$     0190  0200  0230  1760
  P1      5270  5330
  P1$     0190  0210  0230  1760
  P2      5270  5330
  P2$     0190  0220  0230  1760  4810
  P3      5270  5330
  P4      5270  5330
  P5      5270  5280
  P6      5270
  Q       2320  2350  2370  2640  2660  3890  3920  3940  4150  4210
  Q0      0250
  Q1      0250
  Q2[     0100  0250
  R       0260
  R$      1400  1410  1420
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 20
                    SYMBOL TABLE FOR ISCN07.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------
  R0      0240  0870
  R0$     0190  0230  1760  3330
  R1      0280
  R1$     0270  3290
  R2$     0270  3300
  R3$     0270  0630  0740  2202  2492  3310
  R4$     0100  0270  3270
  R5      0150  1630  1820  1850  2470
  R7      5380  5400  5440
  R8      5390  5400  5440
  R9      2570  2580  4080  4090
  S       2050  2060  2250  2530  3560  3570  3780  4040  5330  5400
          5440
  S0      0240  0870
  S9      0240  0870
  T0      0240  0870
  U$      0110  3410  3480  3490  3500  3600  3610  3750  3880  3980
          4000  4020  4100  4120  4190
  U0      0240  0870
  U1$     0110  0260  4720  4730  4740
  U2$     0260
  W       0260
  W0      0240  0300  0870  1220  1240  1300  1370  1380  1800  3430
  W1      0130  1320  1360  1640  1790  1800  3390  3420  3430  3490
          5160  5170  5220  5230
  W2      0140  2010  3530  5190  5200
  W5      0290  1000  1090  1220  1260  1290  1320  1370
  W6      0300  1110  1200  1240  1260  1300  1320  1370  1380
  X       2560  2580  4070  4090
  X0      0260
  X9      0260
  Y0      0240  0580  0850  0870  2090  3600
  Y1      0580  0600  0690  0820  0850
  Y8      0570  0710  0800  0820  0860
  Y9      0240  0570  0860  0870  2100  3610
```

SECTION 11

ISCN.08 - THE CALIBRATION CURVE PLOTTER

The program which plots standard calibration curves on compatible graphics terminals (ISCN.08) is essentially an adaptation of the CALPLOT program which is documented elsewhere.[5] The differences between this program and CALPLOT will be noted here. The function and flow of ISCN.08 is shown in Figure 13. The program is multi-entrant since it may be accessed from ISCN.00, ISCN.04, and from INITIALIZE.2 in the case of off-line plotting during a RUN.

The program is equipped with a command line which allows for the selection of one of five curve types. Not all of the five curve types may be available in the plot file (ISCN.PT), since the number of standards may not be large enough to accomodate second or third order regression. After a choice is made, the sequential plot file (ISCN.PT) is opened and a block of data is read. Parameters are compared and if a match is found the curve is plotted. Once a plot selection has been validated, the routine puts the graphics device in plot mode. The same sequence of statements is used for both Tektronix and Hewlett Packard graphics devices. A Tektronix terminal will briefly show the symbols used to invoke plotting on an HP terminal, however, the affect is practically unnoticeable at 1200 BAUD.

The actual plotting is straight forward. No steps have been taken to streamline the routine from its original CALPLOT form. Once a plot has been output, a 150 second delay is taken before the plot is erased and the plot option line is invoked. The plot option line itself is equipped with a time-out of two minutes if an analyst leaves the terminal unattended. If the automation system plotter is being used for off-line plotting during the RUN, an automatic BYE will be executed when the session is terminated. In other cases, control will be returned to the source program (either ISCN.00 or ISCN.04) and the ASCL or the IRCL will be in invoked.

ESCape is enabled to return control to the plot option line. If an unexpected error is encountered in reading the data file, the program will exit to the calling source program.

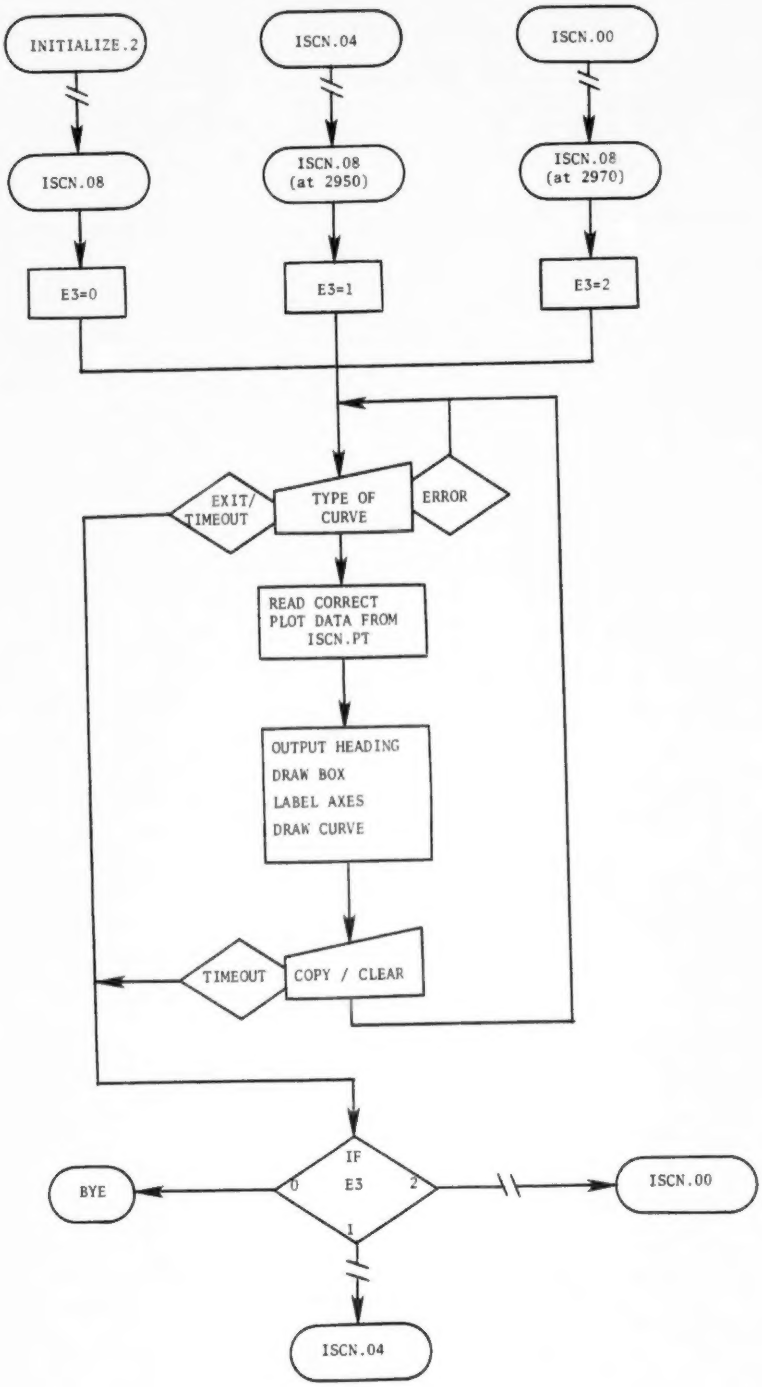
INITIALIZE.2
ISCN.04
ISCN.00
ISCN.08
ISCN.08
(at 2950)
ISCN.08
(at 2970)
E3=0
E3=1
E3=2
EXIT/
TIMEOUT
TYPE OF
CURVE
ERROR
READ CORRECT
PLOT DATA FROM
ISCN.PT
OUTPUT HEADING
DRAW BOX
LABEL AXES
DRAW CURVE
TIMEOUT
COPY / CLEAR
IF
E3
0
2
1
BYE
ISCN.00
ISCN.04

Figure 13. Program ISCN.08 -- Calibration curve plotter.

TABLE 14. SYMBOL DEFINITIONS FOR ISCN.08

A	an error instigating variable
A$	the analyte name string
B	a sorting variable
B(	the absorbance array
C	the fitting error
C$	the name of the plot file
C(	the concentration array
D	the degree of the regression equation
D1	the month that the plot was generated
D2	the day that the plot was generated
D3	the year that the plot was generated
E	a sorting variable
E3	program entry code - dictates exit routing
F$	a general purpose format string
I	a counter
I$	the instrument name string
J	a counter
MO	the computational mode flag
MO$	the response to the plot-type prompt
N	the number of concentration vs. absorbance pairs
O$	the analyst's initial string
P$	the program and data file prefix
P1	a plot variable
P1$	a plot variable
P2	a plot variable
P2$	a plot variable
P3	a plot variable
P3$	a plot variable
P4	a plot variable
P4$	a plot variable
P5	a plot variable
P5$	a plot variable
P6	a plot variable
P7	a plot variable
P8	a plot variable
P9	a plot variable
P(	a plot variable
Q1	Plot variable for axis generation
Q2	Plot variable for axis generation
Q3	Plot variable for axis generation
Q4	Plot variable for axis generation
Q5	Plot variable for axis generation
Q6	Plot variable for axis generation

TABLE 14 (Contd.)

Q7	Plot variable for axis generation
Q8	Plot variable for axis generation
Q9	Plot variable for axis generation
Q(	Plot variable for axis generation
S$	the absorbance scale label
S1	plot variable for scaling
S2	plot variable for scaling
S3	plot variable for scaling
S4	plot variable for scaling
S5	plot variable for scaling
S6	plot variable for scaling
S7	plot variable for scaling
S(	plot variable for scaling
T	a tabbing variable
U$	the concentration units string
U1	plot variable for marking points
U2	plot variable for marking points
U3	plot variable for marking points
X8	the lowest concentration scaling value
X9	the highest concentration scaling value
Y	the computed concentration
Y0	the intercept term of the regression equation
Y1	the first order term of the regression equation
Y2	the second order term of the regression equation
Y3	the third order term of the regression equation
Y8	the lowest absorbance scaling value
Y9	the highest absorbance scaling value

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE  1
                  PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.08 - CALIBRATION CURVE PLOTTER            *
0040 REM *   BY K.KOPKE, D.FLECK, D.RYAN  AUGUST 17, 1978            *
0050 REM *   MOST RECENT REVISION: DECEMBER 10, 1979 (D.RYAN)        *
0060 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0070 LET E3=0
0080 ON ESC THEN GOTO 2910
0110 PRINT
0120 PRINT "CALIBRATION PLOTTER BEGINS"
0130 DIM C$[14],P[102],Q[102]
0140 DIM O$[20],I$[20],A$[20],U$[6],S$[20],C[30],B[30],F$[74]
0150 LET P$="ISCN"
0192 ESC
0200 LET C$=P$,".PT"
0210 ON ERR THEN GOTO 2880
0220 REM GET TYPE OF PLOT
0230 GOTO 0320
0260 PRINT "   Z - FORCED ZERO LINEAR FIT"
0270 PRINT "   L - LINEAR"
0280 PRINT "   Q - QUADRATIC"
0290 PRINT "   C - CUBIC"
0300 PRINT "   I - INTERPOLATION"
0310 PRINT "   X - EXIT PLOT ROUTINE"
0320 ON ESC THEN GOTO 0320
0330 ESC
0340 PRINT
0350 TIME =300
0360 LET M0$="GLICH"
0370 PRINT "TYPE OF PLOT? ([H]ZLQCIX) ";
0380 ON ERR THEN GOTO 0400
0390 TINPUT " > ",M0$;
0400 ON ERR THEN STOP
0410 PRINT
0420 IF SYS(7)<>60 THEN GOTO 0460
0430 PRINT
0440 PRINT "<7>NO ACTIVITY FOR TWO MINUTES!"
0450 GOTO 2740
0460 IF M0$="X" THEN GOTO 2740
0470 IF M0$<>"H" THEN IF LEN(M0$)<>0 THEN GOTO 0490
0480 GOTO 0260
0490 IF LEN(M0$)<>1 THEN GOTO 0520

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE  2
                  PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0500 LET M0=POS("ZLQCI",M0$,1)
0510 IF M0>0 THEN GOTO 0540
0520 PRINT "<7>";
0530 GOTO 0320
0540 LET M0=M0-1
0550 REM++++++++++++++++++++++++++++++++++++++++++++++++++++ READ DATA
0560 ON ERR THEN GOTO 0564
0562 RENAME C$,C$
0564 ON ERR THEN GOTO 2880
0566 IF SYS(7)<>-9 THEN GOTO 2880
0570 NOESC
0580 OPEN FILE[5,3],C$
0590 READ FILE[5],O$
0600 IF EOF(5)<>1 THEN GOTO 0650
0610 CLOSE FILE[5]
0620 PRINT
0630 PRINT "<7>CHOSEN PLOT TYPE NOT AVAILABLE!"
0640 GOTO 0320
0650 READ FILE[5],I$
0660 READ FILE[5],A$
0670 READ FILE[5],U$
0680 READ FILE[5],S$
0690 READ FILE[5],D,Y0,Y1,Y2,Y3
0700 FOR I=0 TO 3
0710   IF D=I THEN GOTO 0740
0720 NEXT I
0730 GOTO 2880
0740 READ FILE[5],N,C,D1,D2,D3
0750 IF N=INT(N) THEN IF 0<N THEN IF N<31 THEN GOTO 0770
0760 GOTO 2880
0770 FOR I=1 TO N
0780   READ FILE[5],B[I],C[I]
0790 NEXT I
0800 IF M0=0 THEN IF D=1 THEN IF Y0=0 THEN GOTO 0840
0805 IF M0=1 THEN IF D=1 THEN IF Y0<>0 THEN GOTO 0840
0810 IF M0=2 THEN IF D=2 THEN GOTO 0840
0815 IF M0=3 THEN IF D=3 THEN GOTO 0840
0820 IF M0=4 THEN IF D=0 THEN GOTO 0840
0830 GOTO 0590
0840 CLOSE FILE[5]
0850 ON ESC THEN GOTO 2670
0860 ESC

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  3
                    PROGRAM LISTING FOR ISCN08.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
 0870 REM+++++++++++++++++++++++++++++++++++++++++++++++++++ PRINT HEADINGS
 0880 PRINT "<27>H";
 0890 PRINT "<27>J";
 0900 PRINT "<27>&S1P0Q"
 0910 PRINT "<27><12>";
 0920 DELAY =1
 0960 GOSUB 3410
 0970 PRINT  TAB(23);"C-A-L-I-B-R-A-T-I-O-N   C-U-R-V-E"
 0980 LET T=INT((48-LEN(O$)-LEN(I$))/2)
 0990 PRINT  TAB(T);"OPERATOR: ";O$;"    INSTRUMENT: ";I$
 1000 LET T=INT((23-LEN(A$))/2)
 1010 PRINT  TAB(T);"ANALYTE: ";A$;
 1020 PRINT USING "    RAN: ##/##/####    PLOTTED: ##/##/####",D1,D2,D3
*      ,SYS(2),SYS(1),SYS(3)
 1030 IF D<>0 THEN GOTO 1060
 1040 PRINT  TAB(31);"INTERPOLATED"
 1050 GOTO 1180
 1060 PRINT USING "                    DEGREE: #    FITTING ERROR: ----#.
*      ## %",D,C
 1070 LET F$="CONCENTRATION = +#.##^^^^   +#.##^^^^ *S  +#.##^^^^ *S^2
*       +#.##^^^^ *S^3"
 1080 ON D THEN GOTO 1090, 1120, 1150
 1090 PRINT  TAB(17);
 1100 PRINT USING F$[1,40],Y0,Y1
 1110 GOTO 1180
 1120 PRINT  TAB(9);
 1130 PRINT USING F$[1,56],Y0,Y1,Y2
 1140 GOTO 1180
 1150 PRINT  TAB(1);
 1160 PRINT USING F$,Y0,Y1,Y2,Y3
 1170 REM+++++++++++++++++++++++++++++++++++++++++++++++++++++++++ DRAW BOX
 1180 RANDOMIZE
 1190 LET P1=RND(1)*5
 1200 LET P2=RND(1)*5
 1210 LET P3=0
 1220 GOSUB 3900
 1230 LET Q1=147
 1240 LET Q2=70
 1250 LET Q3=11
 1260 LET Q4=78
 1270 LET Q5=2
 1280 GOSUB 3560

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  4
                    PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1290 LET Q4=54
1300 LET Q5=1
1310 GOSUB 3560
1320 LET Q2=664
1330 LET Q4=78
1340 LET Q5=-2
1350 GOSUB 3560
1360 LET Q1=1005
1370 LET Q2=70
1380 LET Q4=54
1390 LET Q5=-1
1400 GOSUB 3560
1410 REM+++++++++++++++++++++++++++++++++++++++++++++ PUT STANDARDS IN ORDER
1420 FOR J=N-1 TO 1 STEP -1
1430   FOR I=1 TO J
1440     IF B[I]<=B[I+1] THEN GOTO 1510
1450     LET B=B[I]
1460     LET E=C[I]
1470     LET B[I]=B[I+1]
1480     LET C[I]=C[I+1]
1490     LET B[I+1]=B
1500     LET C[I+1]=E
1510   NEXT I
1520 NEXT J
1530 REM+++++++++++++++++++++++++++++++++++++++++++++++++++++++++ LABEL AXES
1540 LET P1=0
1550 LET P2=500
1560 LET P3=3
1570 GOSUB 3900
1580 FOR I=1 TO LEN(S$)
1590   PRINT S$[I,I];"<13>";
1600 NEXT I
1610 LET P1=0
1620 LET P2=0
1630 LET P3=3
1640 GOSUB 3900
1650 LET F$="CONCENTRATION IN ",U$
1660 LET T=(63-LEN(F$))/2+15
1670 PRINT "<29>";P4$;"<31>"; TAB(T);F$
1680 LET S1=0
1690 LET S2=0
1700 FOR I=1 TO N

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  5
                  PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0       0
1710   IF B[I]>S2 THEN LET S2=B[I]
1720 NEXT I
1730 GOSUB 2980
1740 LET Y8=S[1]
1750 LET Y9=S[12]
1760 IF S[12]>=10 THEN GOTO 1790
1770 LET F$="     #.###"
1780 GOTO 1860
1790 IF S[12]>=100 THEN GOTO 1820
1800 LET F$="     ##.##"
1810 GOTO 1860
1820 IF S[12]>=1000 THEN GOTO 1850
1830 LET F$="     ###.#"
1840 GOTO 1860
1850 LET F$="     #####"
1860 LET P1=0
1870 LET P3=3
1880 FOR I=1 TO 12
1890   LET P2=58+(I-1)*54
1900   GOSUB 3900
1910   PRINT "<29>";P4$;"<31>";
1920   PRINT USING F$,S[I]
1930 NEXT I
1940 LET S1=0
1950 LET S2=0
1960 FOR I=1 TO N
1970   IF C[I]>S2 THEN LET S2=C[I]
1980 NEXT I
1990 GOSUB 2980
2000 LET X8=S[1]
2010 LET X9=S[12]
2020 IF S[12]>=10 THEN GOTO 2050
2030 LET F$=" #.##"
2040 GOTO 2090
2050 IF S[12]>=100 THEN GOTO 2080
2060 LET F$=" ##.#"
2070 GOTO 2090
2080 LET F$="#####"
2090 LET P2=30
2100 FOR I=1 TO 12
2110   LET P1=105+(I-1)*78
2120   GOSUB 3900

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0       0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                   PAGE  6
                  PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0       0
2130   PRINT "<29>";P4$;"<31>";
2140   PRINT USING F$,S[I]
2150 NEXT I
2160 REM+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ DRAW MARKERS
2170 LET P4=P4+147
2180 LET P5=P5+70
2190 LET P5$="*"
2200 FOR I=1 TO N
2210   LET P[I]=858*(C[I]-X8)/(X9-X8)
2220   LET Q[I]=594*(B[I]-Y8)/(Y9-Y8)
2230 NEXT I
2240 LET Q3=N
2250 LET Q7=-1
2260 IF D<>0 THEN GOTO 2320
2270 LET Q7=1
2280 LET P1=858*(C[1]-X8)/(X9-X8)
2290 LET P2=594*(B[1]-Y8)/(Y9-Y8)
2300 LET P3=3
2310 GOSUB 3900
2320 GOSUB 3260
2330 REM+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++ DRAW CURVE
2340 IF D=0 THEN GOTO 2560
2350 LET Q3=1
2360 FOR I=0 TO 1.01*B[N] STEP B[N]/100
2370   LET Q[Q3]=594*(I-Y8)/(Y9-Y8)
2380   LET Y=Y0+Y1*I
2390   IF D>1 THEN LET Y=Y+Y2*I^2
2400   IF D>2 THEN LET Y=Y+Y3*I^3
2410   LET P[Q3]=858*(Y-X8)/(X9-X8)
2420   IF P[Q3]<0 THEN GOTO 2470
2430   IF P[Q3]>858 THEN GOTO 2470
2440   IF Q[Q3]<0 THEN GOTO 2470
2450   IF Q[Q3]>594 THEN GOTO 2470
2460   LET Q3=Q3+1
2470 NEXT I
2480 LET Q3=Q3-1
2490 LET P1=P[1]
2500 LET P2=Q[1]
2510 LET P3=3
2520 GOSUB 3900
2530 LET Q7=0
2540 GOSUB 3260

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0       0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  7
                     PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2550 REM++++++++++++++++++++++++++++++++++++++++++++++++++++ WRAPUP
2560 FOR I=1 TO 5
2570   DELAY =.3
2580   PRINT "<7>"
2590 NEXT I
2600 TIME =600
2610 ON ERR THEN GOTO 2630
2620 TINPUT " ",F$
2630 ON ERR THEN STOP
2640 ON ERR THEN GOTO 2660
2650 LET A=A/0
2660 ON ERR THEN STOP
2670 NOESC
2680 PRINT "<27>E"
2682 DELAY =1
2690 PRINT "<27>H";
2700 PRINT "<27>J";
2710 PRINT "<27><12>"
2720 DELAY =1
2730 GOTO 0320
2740 NOESC
2750 PRINT "<27>E"
2752 DELAY =1
2760 PRINT "<27>H";
2770 PRINT "<27>J";
2780 PRINT "<27><12>"
2790 DELAY =1
2800 IF E3<>1 THEN GOTO 2832
2810 LET P2$=P$,".04"
2820 ON ERR THEN GOTO 2832
2830 CHAIN P2$
2832 ON ERR THEN STOP
2834 IF E3<>2 THEN GOTO 2850
2836 LET P2$=P$,".00"
2838 ON ERR THEN GOTO 2842
2840 CHAIN P2$
2842 ON ERR THEN STOP
2850 CLOSE
2860 BYE
2870 REM++++++++++++++++++++++++++++++++++++ ABNORMAL END PROCEDURE
2880 ON ERR THEN STOP
2890 PRINT

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  8
                     PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2900 PRINT "<7><7>DATA ERROR!<7><7>"
2910 PRINT
2920 PRINT "THIS PROGRAM IS BEING TERMINATED."
2930 GOTO 2740
2940 REM ENTRY FROM IRCL(2) USING PC COMMAND
2950 LET E3=1
2960 GOTO 0080
2968 REM ENTRY FROM ASCL(1) USING PC COMMAND
2970 LET E3=2
2972 GOTO 0080
2980 DIM S[12]
2990 LET S7=0
3000 LET S3=S2-S1
3010 IF S3>=100 THEN GOTO 3060
3020 LET S1=S1*10
3030 LET S2=S2*10
3040 LET S7=S7+1
3050 GOTO 3000
3060 LET S4=0
3070 IF S3<100 THEN GOTO 3110
3080 LET S3=S3/10
3090 LET S4=S4+1
3100 GOTO 3070
3110 IF S1=0 THEN IF S3-10*INT(S3/10)<=INT(S3/10) THEN LET S3=10*INT(S
*    3/10)
3120 LET S3=INT(S3+.5)
3130 IF S3-10*INT(S3/10)=0 THEN GOTO 3170
3140 IF S3-10*INT(S3/10)=5 THEN GOTO 3170
3150 LET S3=S3+1
3160 GOTO 3130
3170 LET S5=S3*10^(S4-1)
3180 LET S1=INT(S1/10^(S4-1))*10^(S4-1)
3190 IF S1/S5=INT(S1/S5) THEN GOTO 3220
3200 LET S1=S1-10^(S4-1)
3210 GOTO 3190
3220 FOR S6=1 TO 12
3230   LET S[S6]=(S1+(S6-1)*S5)/10^(S7)
3240 NEXT S6
3250 RETURN
3260 LET Q8=0
3270 LET P3=3
3280 IF Q7>=0 THEN LET P3=2

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3290 FOR Q9=1 TO Q3
3300   LET P1=P[Q9]
3310   LET P2=Q[Q9]
3320   GOSUB 3900
3330   LET Q8=Q8+1
3340   IF Q8<>ABS(Q7) THEN GOTO 3390
3350   LET U1=P[Q9]
3360   LET U2=Q[Q9]
3370   GOSUB 3440
3380   LET Q8=0
3390 NEXT Q9
3400 RETURN
3410 DIM P5$[10]
3420 GOSUB 3800
3430 RETURN
3440 LET P1=U1-5
3450 LET P2=U2-8
3460 LET U3=P3
3470 LET P3=3
3480 GOSUB 3900
3490 PRINT "<29>";P4$;
3500 PRINT "<31>";P5$[1,LEN(P5$)]
3510 LET P1=U1
3520 LET P2=U2
3530 GOSUB 3900
3540 LET P3=U3
3550 RETURN
3560 LET P1=Q1
3570 LET P2=Q2
3580 LET P3=3
3590 GOSUB 3900
3600 LET P3=2
3610 IF ABS(Q5)=1 THEN GOTO 3710
3620 FOR Q6=1 TO Q3+1
3630   GOSUB 3900
3640   LET P2=P2+10*Q5/ABS(Q5)
3650   GOSUB 3900
3660   LET P2=P2-10*Q5/ABS(Q5)
3670   GOSUB 3900
3680   LET P1=P1+Q4
3690 NEXT Q6
3700 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3710 FOR Q6=1 TO Q3+1
3720   GOSUB 3900
3730   LET P1=P1+10*Q5/ABS(Q5)
3740   GOSUB 3900
3750   LET P1=P1-10*Q5/ABS(Q5)
3760   GOSUB 3900
3770   LET P2=P2+Q4
3780 NEXT Q6
3790 RETURN
3800 DIM P1$[32],P2$[32],P3$[32],P4$[4]
3810 LET P4=0
3820 LET P5=0
3830 LET P6=0
3840 LET P1$=" !<34>#$%&'()*+,-./0123456789:;<=>?"
3850 LET P2$="@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_"
3860 LET P3$="`ABCDEFGHIJKLM"
3870 LET P3$=P3$,"NOPQRSTUVWXY"
3880 LET P3$=P3$,"Z[\]^^"
3890 RETURN
3900 IF P3<>0 THEN GOTO 3940
3910 LET P4=P1
3920 LET P5=P2
3930 RETURN
3940 PRINT "<29>";
3950 IF LEN(P4$)<>0 THEN PRINT P4$[4,4];
3960 LET P7=INT(P1+P4)
3970 LET P8=INT(P2+P5)
3980 IF P7>1023 THEN LET P7=1023
3990 IF P7<0 THEN LET P7=0
4000 IF P8>780 THEN LET P8=780
4010 IF P8<0 THEN LET P8=0
4020 IF P3=2 THEN LET P6=1
4030 IF P3=3 THEN LET P6=0
4040 LET P9=INT(P8/32)
4050 LET P8=P8-(P9*32)+1
4060 LET P9=P9+1
4070 LET P4$=P1$[P9,P9],P3$[P8,P8]
4080 LET P9=INT(P7/32)
4090 LET P7=P7-(P9*32)+1
4100 LET P9=P9+1
4110 LET P4$=P4$,P1$[P9,P9],P2$[P7,P7]
4120 IF P6<>0 THEN GOTO 4140

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE 11
                   PROGRAM LISTING FOR ISCN08.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4130 PRINT "<29>";
4140 PRINT P4$
4150 RETURN




























1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE 12
                   SYMBOL TABLE FOR ISCN08.AS

SYMBOL    REFERENCES
------    --------------------------------------------------------------
0080  2960  2972
0260  0480
0320  0230  0320  0530  0640  2730
0400  0380
0460  0420
0490  0470
0520  0490
0540  0510
0564  0560
0590  0830
0650  0600
0740  0710
0770  0750
0840  0800  0805  0810  0815  0820
1060  1030
1090  1080
1120  1080
1150  1080
1180  1050  1110  1140
1510  1440
1790  1760
1820  1790
1850  1820
1860  1780  1810  1840
2050  2020
2080  2050
2090  2040  2070
2320  2260
2470  2420  2430  2440  2450
2560  2340
2630  2610
2660  2640
2670  0850
2740  0450  0460  2930
2832  2800  2820
2842  2838
2850  2834
2880  0210  0564  0566  0730  0760
2910  0080
2980  1730  1990
3000  3050
3060  3010
3070  3100
3110  3070
3130  3160
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 13
                       SYMBOL TABLE FOR ISCN08.AS

SYMBOL    REFERENCES
------  -------------------------------------------------------------------
 3170   3130  3140
 3190   3210
 3220   3190
 3260   2320  2540
 3390   3340
 3410   0960
 3440   3370
 3560   1280  1310  1350  1400
 3710   3610
 3800   3420
 3900   1220  1570  1640  1900  2120  2310  2520  3320  3480  3530
        3590  3630  3650  3670  3720  3740  3760
 3940   3900
 4140   4120
 A      2650
 A$     0140  0660  1000  1010
 B      1450  1490
 B[     0140  0780  1440  1450  1470  1490  1710  2220  2290  2360
 C      0740  1060
 C$     0130  0200  0562  0580
 C[     0140  0780  1460  1480  1500  1970  2210  2280
 D      0690  0710  0800  0805  0810  0815  0820  1030  1060  1080
        2260  2340  2390  2400
 D1     0740  1020
 D2     0740  1020
 D3     0740  1020
 E      1460  1500
 E3     0070  2800  2834  2950  2970
 F$     0140  1070  1100  1130  1160  1650  1660  1670  1770  1800
        1830  1850  1920  2030  2060  2080  2140  2620
 FL#5   0580  0590  0610  0650  0660  0670  0680  0690  0740  0780
        0840
 I      0700  0710  0720  0770  0780  0790  1430  1440  1450  1460
        1470  1480  1490  1500  1510  1580  1590  1600  1700  1710
        1720  1880  1890  1920  1930  1960  1970  1980  2100  2110
        2140  2150  2200  2210  2220  2230  2360  2370  2380  2390
        2400  2470  2560  2590
 I$     0140  0650  0980  0990
 J      1420  1430  1520
 MO     0500  0510  0540  0800  0805  0810  0815  0820
 MO$    0360  0390  0460  0470  0490  0500
 N      0740  0750  0770  1420  1700  1960  2200  2240  2360
 O$     0140  0590  0980  0990
 P$     0150  0200  2810  2836
 P1     1190  1540  1610  1860  2110  2280  2490  3300  3440  3510
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 14
                       SYMBOL TABLE FOR ISCN08.AS

SYMBOL    REFERENCES
------  -------------------------------------------------------------------
        3560  3680  3730  3750  3910  3960
 P1$    3800  3840  4070  4110
 P2     1200  1550  1620  1890  2090  2290  2500  3310  3450  3520
        3570  3640  3660  3770  3920  3970
 P2$    2810  2830  2836  2840  3800  3850  4110
 P3     1210  1560  1630  1870  2300  2510  3270  3280  3460  3470
        3540  3580  3600  3900  4020  4030
 P3$    3800  3860  3870  3880  4070
 P4     2170  3810  3910  3960
 P4$    1670  1910  2130  3490  3800  3950  4070  4110  4140
 P5     2180  3820  3920  3970
 P5$    2190  3410  3500
 P6     3830  4020  4030  4120
 P7     3960  3980  3990  4080  4090  4110
 P8     3970  4000  4010  4040  4050  4070
 P9     4040  4050  4060  4070  4080  4090  4100  4110
 P[     0130  2210  2410  2420  2430  2490  3300  3350
 Q1     1230  1360  3560
 Q2     1240  1320  1370  3570
 Q3     1250  2240  2350  2370  2410  2420  2430  2440  2450  2460
        2480  3290  3620  3710
 Q4     1260  1290  1330  1380  3680  3770
 Q5     1270  1300  1340  1390  3610  3640  3660  3730  3750
 Q6     3620  3690  3710  3780
 Q7     2250  2270  2530  3280  3340
 Q8     3260  3330  3340  3380
 Q9     3290  3300  3310  3350  3360  3390
 Q[     0130  2220  2370  2440  2450  2500  3310  3360
 S$     0140  0680  1580  1590
 S1     1680  1940  3000  3020  3110  3180  3190  3200  3230
 S2     1690  1710  1950  1970  3000  3030
 S3     3000  3010  3070  3080  3110  3120  3130  3140  3150  3170
 S4     3060  3090  3170  3180  3200
 S5     3170  3190  3230
 S6     3220  3230  3240
 S7     2990  3040  3230
 S[     1740  1750  1760  1790  1820  1920  2000  2010  2020  2050
        2140  2980  3230
 T      0980  0990  1000  1010  1660  1670
 U$     0140  0670  1650
 U1     3350  3440  3510
 U2     3360  3450  3520
 U3     3460  3540
 X8     2000  2210  2280  2410
 X9     2010  2210  2280  2410
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 15
                         SYMBOL TABLE FOR ISCN08.AS

SYMBOL    REFERENCES
------   -----------------------------------------------------------------

  Y      2380  2390  2400  2410
  Y0     0690  0800  0805  1100  1130  1160  2380
  Y1     0690  1100  1130  1160  2380
  Y2     0690  1130  1160  2390
  Y3     0690  1160  2400
  Y8     1740  2220  2290  2370
  Y9     1750  2220  2290  2370
```

SECTION 12

ISCN.09 - THE PEAK-DATA ARRAY PLOTTER

The ISCN.09 program uses standard plot subroutines[6] and data from the ISCN.PK peak-data file to generate absorbance response curves on a Tecktronix compatible graphics display device. The program is available only in those systems where a large number of digitized voltages are accumulated for a single sample atomization operation. The actual data acquisition and reduction software and the subsequent plot file generation software will be explained for each instrument application in Appendix A. The description of the ISCN.09 program is offered here even though the system application centers on the PE5000.

The function and flow of the ISCN.09 program is shown in Figure 14. The program is multi-entrant in that it may be accessed from either the ISCN.00 program or the ISCN.04 program. The program prompts the user as to output type since the program is capable of generating either line printer or graphics-display plots of the peak-array data. Since the plot data is ordered sequentially, a starting position is required in order to speed up the plot session. Blocks of data will be read until the chosen "first plot" is reached. A report on the injection is written to the ISCN.LL file and generated to the user terminal. Once the report has been generated the user specifies whether or not a plot is to be generated. If no graphics display device is being used, the report in file ISCN.LL and a crude peak plot will be generated to the lineprinter. If no plot is desired, the program will read the next block of data, generate a terminal report and repeat the cycle until no more data is available. Normally, the ESCape mechanism is set so that the program is immediately exited when ESCape is triggered. However, if an EScape is pressed during the output of the peak report to the terminal, control will immediately shift to the plot-prompt. The ESCape, in this instance, was used as a means to expedite the session.

If a Tektronix compatible graphics display device is specified, a different sequence of events is followed. The peak report will still be generated to the terminal but will appear in "alpha" form on the Tektronix terminals and in reduced "graphics" form on the Hewlett Packard 2648 terminals. The program was written so that a simple subroutine could turn graphics mode on and off for the HP terminals without affecting the Tektronix devices. This difference manifests itself in slightly different plots, and the temporary appearance of extraneous characters (on the Tektronix terminals). Sufficient time is given at the completion of plot generation so that a user may copy the screen to a hard copy unit.

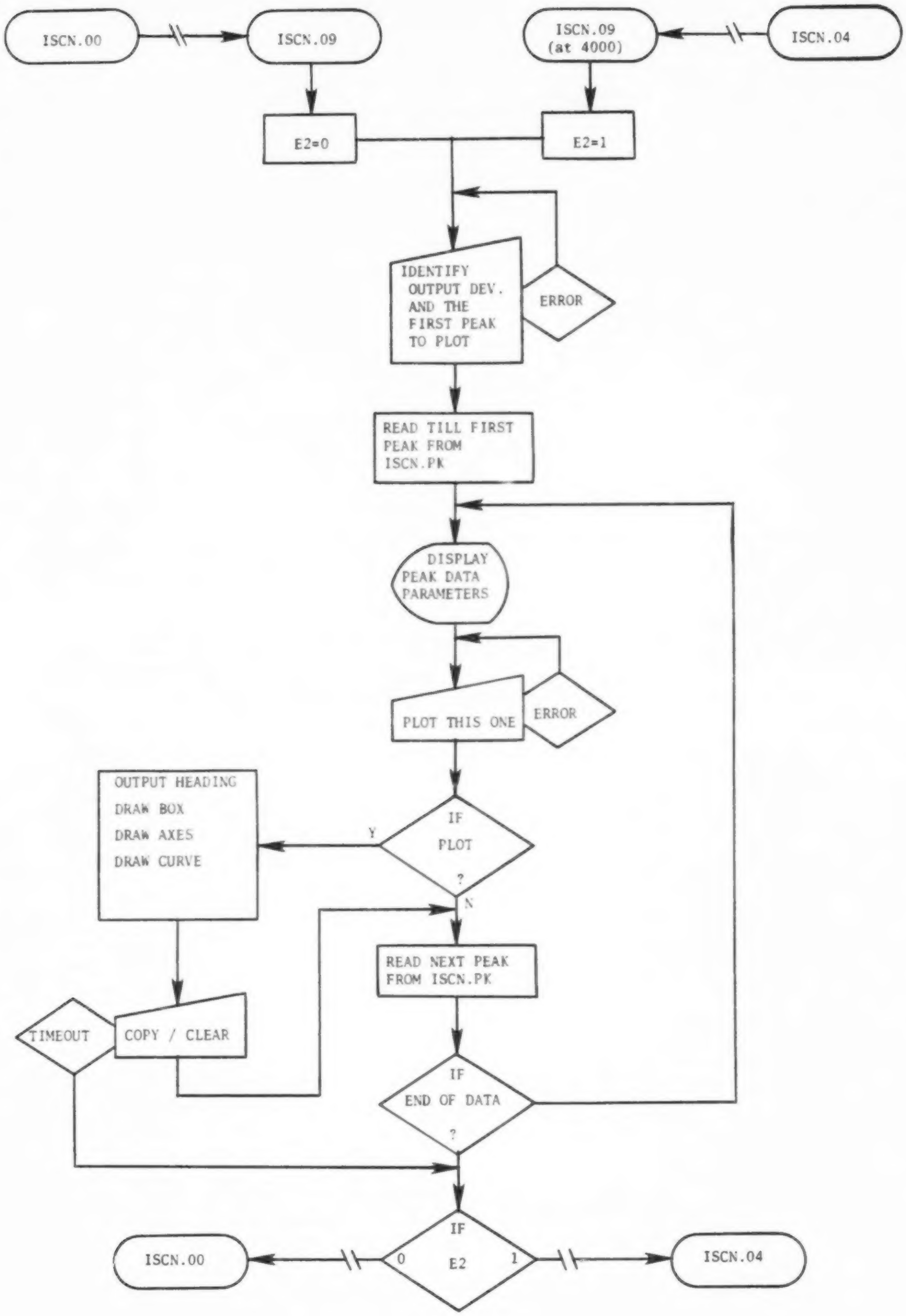
ISCN.00
ISCN.09
ISCN.09
(at 4000)
ISCN.04
E2=0
E2=1
IDENTIFY
OUTPUT DEV.
AND THE
FIRST PEAK
TO PLOT
ERROR
READ TILL FIRST
PEAK FROM
ISCN.PK
DISPLAY
PEAK DATA
PARAMETERS
PLOT THIS ONE
ERROR
OUTPUT HEADING
DRAW BOX
DRAW AXES
DRAW CURVE
Y
IF
PLOT
?
N
READ NEXT PEAK
FROM ISCN.PK
TIMEOUT
COPY / CLEAR
IF
END OF DATA
?
IF
E2
0
1
ISCN.00
ISCN.04

Figure 14. Program ISCN.09 -- Raw peak data plotter.

TABLE 15. SYMBOL DEFINITIONS FOR ISCN.09

A$	a response to a prompt
A1	the average leading baseline
A3	the baseline standard deviation
A9	a dummy variable
B$	a general purpose string
D$	the sequencing mode descriptor
D0$	the terminal type flag
D1	month that plot was generated
D2	day that plot was generated
D3	year that plot was generated
D6	the sample type flag
E2	the program entry/exit flag
F	the plot frequency decrement
F3$	the name of a list file
F4$	the name of the plot file
H0	the maximum array value
I	a counter
I0	the location of the minimum array value (L0)
I2	the location of the maximum array value (H0)
I3	the exact peak location
L0	the minimum array value
L1	the peak number
L5	the number of the first peak to be plotted
M1	the sequencing mode flag
N2	the number of actual array points
P$	the prefix for program and file names
P1	a plot variable
P1$	a plot variable
P2	a plot variable
P2$	a plot variable
P3	a plot variable
P3$	a plot variable
P4	a plot variable
P4$	a plot variable
P5	a plot variable
P6	a plot variable
P7	a plot variable
P8	a plot variable
P9	a plot variable
P(	a plot variable
Q$	general purpose format string

TABLE 15 (Contd.)

Q1	a plot variable for axis generation
Q2	a plot variable for axis generation
Q3	a plot variable for axis generation
Q4	a plot variable for axis generation
Q5	a plot variable for axis generation
Q6	a plot variable for axis generation
Q7	a plot variable for axis generation
Q8	a plot variable for axis generation
Q9	a plot variable for axis generation
Q(	a plot variable for axis generation
R1$	analyst's initials
R2$	analyte name
R4$	instrument name
S0$	the sample type description super-string
S1	a plot variable for scaling
S2	a plot variable for scaling
S3	a plot variable for scaling
S4	a plot variable for scaling
S5	a plot variable for scaling
S6	a plot variable for scaling
S7	a plot variable for scaling
S(	a plot variable for scaling
T	a tabbing variable
T0	a tabbing variable
T1	hour that plot was generated
T2	minute that plot was generated
T3	second that plot was generated
V1	the computed peak height
W1	wheel position of sample
Z4$	sample type
Z5	CALL 7 channel number
Z5$	sample identifier
Z6	the delay before data taking starts (*1/60 second)
Z7	the time between points (*1/60 second)
Z8	the number of points in the CALL 7

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  1
                     PROGRAM LISTING FOR ISCN09.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0002 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0004 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM          *
0006 REM *   PROGRAM: ISCN.09 - PEAK PLOTTING PROGRAM (LPT OR PLT)     *
0008 REM *              HP-2648/TECTRONIX COMPATIBLE                   *
0010 REM *   BY D.RYAN/J.KOPKE (SWORCC), JANUARY 10, 1979              *
0012 REM *   MOST RECENT REVISION: FEBRUARY 6, 1980                    *
0014 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 LET E2=0
0040 ON ESC THEN GOTO 2210
0044 ON ERR THEN STOP
0050 LET L1=0
0060 PRINT
0062 PRINT "ATOMIC ABSORPTION RAW DATA PLOTTER"
0064 PRINT
0066 LET P$="ISCN"
0069 ESC
0070 LET F4$=P$,".PK"
0075 LET F3$=P$,".LL"
0076 IF E2=0 THEN GOTO 0080
0077 LET D0$="T"
0078 GOTO 0090
0080 PRINT
0082 PRINT "TEKTRONIX OR LINEPRINTER (T[CR] OR L) ";
0084 ON ERR THEN GOTO 3000
0086 INPUT " > ",D0$;
0088 ON ERR THEN GOTO 2210
0090 PRINT
0092 IF LEN(D0$)=0 THEN LET D0$="T"
0094 IF D0$="T" THEN GOTO 0120
0096 IF D0$<>"L" THEN GOTO 0080
0098 GOTO 0140
0120 GOSUB 4600
0130 GOSUB 9958
0140 PRINT
0142 PRINT "NUMBER OF FIRST PEAK ";
0144 ON ERR THEN GOTO 3000
0146 INPUT " > ",L5;
0148 ON ERR THEN GOTO 2210
0150 PRINT
0152 IF L5<>INT(ABS(L5)) THEN GOTO 0140
0190 DIM S0$[150],Z4$[20],Z5$[20]
0192 LET S0$="TIMING SET STD INSTR CAL STD  UNKNOWN SAMPLE SPIKED UNKN
*         OWN "

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  2
                     PROGRAM LISTING FOR ISCN09.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0194 LET S0$=S0$,"CHECK STANDARD DUPLICATE SAMP LAB CNTRL STD  "
0196 LET S0$=S0$,"REAGENT BLANK  SURROGATE SPK  INSTR BLANK    "
0200 DIM R4$[20],A$[20],B$[20],Q$[80],D$[20]
0220 DIM Q$[80],D$[20]
0230 DIM P[300],Q[300]
0232 FOR I=1 TO 300
0234   LET P[I]=I
0236 NEXT I
0240 OPEN FILE[4,3],F4$
0250 LET L1=L1+1
0252 NOESC
0260 READ FILE[4],D1,D2,D3,T1,T2,T3
0270 IF EOF(4)=1 THEN GOTO 2210
0280 READ FILE[4],R1$,R2$,R3$,R4$,R5$
0290 READ FILE[4],Z1$,Z2$,Z3$,Z4$,Z5$
0300 READ FILE[4],Z5,Z6,Z7,Z8,N2,N1,H0,L0,E0,E1,W1,A9,A9
0305 READ FILE[4],I0,I1,I2,I3,V1,A1,V2,M1,A3,D7,D6,A9,A9
0310 MAT READ FILE[4],Q
0311 ESC
0312 IF L1>=L5 THEN GOTO 0390
0314 PRINT
0360 GOTO 0250
0390 OPEN FILE[3,1],F3$
0400 PRINT FILE[3]
0410 PRINT FILE[3], TAB(16);"ATOMIC ABSORPTION ARRAY PARAMETERS (";P$;
*         ")"
0420 PRINT FILE[3]
0430 LET Q$="     DATE: ##/##/#### - ##:##:##   MEASURED: ##/##/#### -
*          ##:##:##"
0440 PRINT FILE[3],USING Q$,SYS(2),SYS(1),SYS(3),SYS(11),SYS(12),SYS(1
*         3),D1,D2,D3,T1,T2,T3
0450 LET Q$="     ANALYST: ######                    ANALYTE: ####"
0460 PRINT FILE[3],USING Q$,R1$,R2$
0470 LET Q$="     SAMPLE TYPE: ################ SAMPLE ID: ###########
*         #####"
0472 LET Z4$=S0$[D6*15+1,(D6+1)*15]
0480 PRINT FILE[3],USING Q$,Z4$,Z5$
0490 LET Q$="     PEAK NO: ####                      WHL POS: ###"
0492 PRINT FILE[3],USING Q$,L1,W1
0510 LET Q$="     INSTRUMENT: ################  MODE: ################
*         ###"
0520 LET B$="STD CAL"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
    STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                     PAGE  3
                       PROGRAM LISTING FOR ISCN09.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0540 LET D$="SEMI-AUTO "
0550 IF M1=1 THEN LET D$="FULLY-AUTO "
0560 LET D$=D$,B$
0570 PRINT FILE[3],USING Q$,R4$,D$
0580 LET A$="HEIGHT"
0600 LET Q$="     METHOD: PEAK ########         BASELINE: ########"
0610 LET B$="LEADING"
0630 PRINT FILE[3],USING Q$,A$,B$
0670 LET Q$="     A/D CHANNEL: ##               NUMB PTS IN CALL: ###"
0680 PRINT FILE[3],USING Q$,Z5,Z8
0690 LET Q$="     DELAY BEFORE: #####*(1/60)    TIME BETWEEN PTS: ##*(
*     1/60)"
0700 PRINT FILE[3],USING Q$,Z6,Z7
0710 LET Q$="     NUMB ACTUAL PTS: ###                            "
0760 PRINT FILE[3],USING Q$,N2
0800 LET Q$="     MAX ARRAY VALUE: --#.####     MAX LOCATION: ###"
0810 PRINT FILE[3],USING Q$,H0,I2
0820 LET Q$="     MIN ARRAY VALUE: --#.####     MIN LOCATION: ###"
0830 PRINT FILE[3],USING Q$,L0,I0
0840 LET Q$="     AVE LEADING BSLN: --#.####    BSLN STD DEV: -#.###^^
*     ^^"
0850 PRINT FILE[3],USING Q$,A1,A3
0920 LET Q$="     PEAK HEIGHT: --#.####         PEAK LOCATION: ###.##"
0930 PRINT FILE[3],USING Q$,V1,I3
0980 PRINT FILE[3]
0990 CLOSE FILE[3]
0992 IF D0$="T" THEN GOSUB 4600
1000 OPEN FILE[3,3],F3$
1002 ON ESC THEN GOTO 1052
1010 FOR I=1 TO 200
1020   LREAD FILE[3],Q$,Q1$
1030   IF EOF(3)=1 THEN GOTO 1052
1040   PRINT Q$
1050 NEXT I
1052 ON ESC THEN GOTO 2210
1060 CLOSE FILE[3]
1070 PRINT
1072 PRINT "PLOT PEAK (N[CR] OR Y) ";
1073 LET A$=""
1074 ON ERR THEN GOTO 3000
1076 INPUT " > ",A$;
1078 ON ERR THEN GOTO 2210

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
    STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                     PAGE  4
                       PROGRAM LISTING FOR ISCN09.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1079 PRINT
1080 IF LEN(A$)=0 THEN LET A$="N"
1082 IF A$="Y" THEN GOTO 1088
1083 IF A$<>"N" THEN GOTO 1070
1086 GOTO 0250
1088 IF D0$<>"L" THEN GOTO 1340
1090 GOTO 1130
1100 PRINT "X";
1110 IF ABS(SYS(7))<>48 THEN GOTO 2210
1120 DELAY =2
1130 ON ERR THEN GOTO 1100
1140 OPEN FILE[6,1],"$LPT"
1150 ON ERR THEN GOTO 2210
1160 PRINT
1170 OPEN FILE[3,3],F3$
1180 FOR I=1 TO 200
1190   LREAD FILE[3],Q$,Q1$
1200   IF EOF(3)=1 THEN GOTO 1230
1210   PRINT FILE[6],Q$
1220 NEXT I
1230 CLOSE FILE[3]
1240 PRINT FILE[6],"<12>"
1250 LET F=2
1252 IF N2=300 THEN LET F=4
1260 LET T=55/(H0-L0)
1270 FOR I=1 TO N2 STEP F
1280   LET T0=INT(T*(Q[I]-L0)+.5)
1290   PRINT FILE[6],USING "#####  ",I;
1300   PRINT FILE[6], TAB(T0+1);"*";Q[I]
1310 NEXT I
1320 CLOSE FILE[6]
1330 GOTO 0250
1340 GOSUB 4500
1380 RANDOMIZE
1390 LET P1=RND(1)*10
1400 LET P2=RND(1)*10
1410 LET P3=0
1420 GOSUB 9968
1430 LET S1=L0
1440 LET S2=H0
1450 GOSUB 9805
1480 PRINT  TAB(12);"R-A-W  A-B-S-O-R-B-A-N-C-E  D-A-T-A  P-L-O-T"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  5
                      PROGRAM LISTING FOR ISCN09.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0          0          0          0          0          0          0
 1490 PRINT USING "     PLOTTED: ##/##/#### - ",SYS(2),SYS(1),SYS(3);
 1500 PRINT USING "##:##:##",SYS(11),SYS(12),SYS(13);
 1510 PRINT USING "             RAN: ##/##/#### - ##:##",D1,D2,D3,T1,T2
 1512 PRINT  TAB(8);"PEAK NO: ";L1;"   TYPE: ";SO$[D6*15+1,(D6+1)*15];"
*       WHL POS: ";W1
 1520 PRINT
 1530 LET Q1=120
 1540 LET Q2=40
 1550 LET Q3=6
 1560 LET Q4=150
 1570 LET Q5=2
 1580 GOSUB 9924
 1590 LET Q2=645
 1600 LET Q5=-2
 1610 GOSUB 9924
 1620 LET Q2=40
 1630 LET Q3=11
 1640 LET Q4=55
 1650 LET Q5=1
 1660 GOSUB 9924
 1670 LET Q1=1020
 1680 LET Q5=-1
 1690 GOSUB 9924
 1700 LET P1=0
 1710 LET P2=500+45
 1720 LET P3=3
 1730 GOSUB 9968
 1740 PRINT "<29>";P4$;"<31>";
 1750 LET B$="PEAK ABSORBANCE"
 1760 FOR I=1 TO LEN(B$)
 1770    PRINT B$[I,I];"<10><8>";
 1780 NEXT I
 1790 IF H0>1 THEN GOTO 1820
 1800 LET B$="<29>####<31>-.####"
 1810 GOTO 1830
 1820 LET B$="<29>####<31>-##.##"
 1830 LET P1=21
 1840 LET P3=3
 1850 FOR I=1 TO 12
 1860    LET P2=(I-1)*55+31
 1870    GOSUB 9968
 1880    PRINT USING B$,P4$,S[I]

 1234567891123456789212345678931234567894123456789512345678961234567897
          0          0          0          0          0          0          0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  6
                      PROGRAM LISTING FOR ISCN09.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
1890 NEXT I
1900 FOR I=1 TO 7
1910    LET P1=100+(I-1)*145
1920    LET P2=0
1930    LET P3=3
1940    GOSUB 9968
1950    PRINT "<29>";P4$;"<31>";(N2/6)*(I-1)
1960 NEXT I
1970 FOR I=1 TO N2
1980    LET P[I]=120+900*I/N2
1990    LET Q[I]=((Q[I]-S[1])/(S[12]-S[1]))*605+40
2000 NEXT I
2010 LET Q3=N2
2020 LET Q7=0
2030 LET P1=P[1]
2040 LET P2=Q[1]
2050 LET P3=3
2060 GOSUB 9968
2070 GOSUB 9881
2080 FOR I=1 TO 5
2090    DELAY =.3
2100    PRINT "<7>"
2110 NEXT I
2120 TIME =60
2130 ON ERR THEN GOTO 2150
2140 TINPUT "",A$
2150 ON ERR THEN GOTO 2210
2160 GOSUB 4600
2180 GOTO 0250
2210 NOESC
2212 ON ERR THEN GOTO 2220
2214 CLOSE FILE[4]
2220 ON ERR THEN GOTO 2240
2230 CLOSE FILE[3]
2240 ON ERR THEN GOTO 2260
2250 CLOSE FILE[6]
2260 ON ERR THEN STOP
2270 IF D0$="T" THEN GOSUB 4600
2272 PRINT "NOW LEAVING DATA PLOTTER."
2280 IF E2<>1 THEN GOTO 2320
2282 LET P2$=P$,".04"
2290 ON ERR THEN GOTO 2310

1234567891123456789212345678931234567894123456789512345678961234567897
         0          0          0          0          0          0          0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  7
                    PROGRAM LISTING FOR ISCN09.AS

123456789112345678921234567893123456789412345678951234567896123456789
         0         0         0         0         0         0         0
2300 CHAIN P2$
2310 ON ERR THEN STOP
2320 LET P2$=P$,".00"
2322 ON ERR THEN GOTO 2340
2330 CHAIN P2$
2340 ON ERR THEN STOP
2350 BYE
3000 PRINT "<7> >";
3010 RETRY
3990 REM ENTRY POINT FOR FUTURE ACCESS FROM INSTRUMENT COMMAND LEVEL
4000 LET E2=1
4010 GOTO 0040
4500 PRINT "<27>H";
4520 PRINT "<27>J";
4530 PRINT "<27>&S1P0Q"
4540 PRINT "<27><12>";
4542 DELAY =1
4550 RETURN
4600 PRINT "<27>E"
4602 DELAY =.4
4610 PRINT "<27>H";
4620 PRINT "<27>J";
4630 PRINT "<27><12>";
4632 DELAY =1
4640 RETURN
9805 DIM S[12]
9806 LET S7=0
9808 LET S3=S2-S1
9809 IF S3>=100 THEN GOTO 9815
9810 LET S1=S1*10
9811 LET S2=S2*10
9812 LET S7=S7+1
9813 GOTO 9808
9815 LET S4=0
9816 IF S3<100 THEN GOTO 9820
9817 LET S3=S3/10
9818 LET S4=S4+1
9819 GOTO 9816
9820 IF S1=0 THEN IF S3-10*INT(S3/10)<=INT(S3/10) THEN LET S3=10*INT(S
*    3/10)
9821 LET S3=INT(S3+.5)
9823 IF S3-10*INT(S3/10)=0 THEN GOTO 9828

123456789112345678921234567893123456789412345678951234567896123456789
         0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  8
                    PROGRAM LISTING FOR ISCN09.AS

123456789112345678921234567893123456789412345678951234567896123456789
         0         0         0         0         0         0         0
9824 IF S3-10*INT(S3/10)=5 THEN GOTO 9828
9825 LET S3=S3+1
9826 GOTO 9823
9828 LET S5=S3*10^(S4-1)
9830 LET S1=INT(S1/10^(S4-1))*10^(S4-1)
9831 IF S1/S5=INT(S1/S5) THEN GOTO 9835
9832 LET S1=S1-10^(S4-1)
9833 GOTO 9831
9834 REM   FILL ARRAY WITH LABELS
9835 FOR S6=1 TO 12
9836   LET S[S6]=(S1+(S6-1)*S5)/10^(S7)
9837 NEXT S6
9838 RETURN
9881 LET Q8=0
9882 LET P3=3
9885 IF Q7>=0 THEN LET P3=2
9886 FOR Q9=1 TO Q3
9887   LET P1=P[Q9]
9888   LET P2=Q[Q9]
9889   GOSUB 9968
9890   LET Q8=Q8+1
9891   IF Q8<>ABS(Q7) THEN GOTO 9896
9892   LET U1=P[Q9]
9893   LET U2=Q[Q9]
9894   GOSUB 9908
9895   LET Q8=0
9896 NEXT Q9
9897 RETURN
9922 REM
9924 LET P1=Q1
9925 LET P2=Q2
9926 LET P3=3
9927 GOSUB 9968
9928 LET P3=2
9929 IF ABS(Q5)=1 THEN GOTO 9939
9930 FOR Q6=1 TO Q3+1
9931   GOSUB 9968
9932   LET P2=P2+10*Q5/ABS(Q5)
9933   GOSUB 9968
9934   LET P2=P2-10*Q5/ABS(Q5)
9935   GOSUB 9968
9936   LET P1=P1+Q4

123456789112345678921234567893123456789412345678951234567896123456789
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  9
                  PROGRAM LISTING FOR ISCN09.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
9937 NEXT Q6
9938 RETURN
9939 FOR Q6=1 TO Q3+1
9940   GOSUB 9968
9941   LET P1=P1+10*Q5/ABS(Q5)
9942   GOSUB 9968
9943   LET P1=P1-10*Q5/ABS(Q5)
9944   GOSUB 9968
9945   LET P2=P2+Q4
9946 NEXT Q6
9947 RETURN
9958 DIM P1$[32],P2$[32],P3$[32],P4$[4]
9959 LET P4=0
9960 LET P5=0
9961 LET P6=0
9962 LET P1$=" !<34>#$%&'()*+,-./0123456789:;<=>?"
9963 LET P2$="@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_"
9964 LET P3$="`ABCDEFGHIJKLM"
9965 LET P3$=P3$,"NOPQRSTUVWXY"
9966 LET P3$=P3$,"Z[\]^^"
9967 RETURN
9968 IF P3<>0 THEN GOTO 9972
9969 LET P4=P1
9970 LET P5=P2
9971 RETURN
9972 PRINT "<29>";
9973 IF LEN(P4$)<>0 THEN PRINT P4$[4,4];
9974 LET P7=INT(P1+P4)
9975 LET P8=INT(P2+P5)
9976 IF P7>1023 THEN LET P7=1023
9977 IF P7<0 THEN LET P7=0
9978 IF P8>780 THEN LET P8=780
9979 IF P8<0 THEN LET P8=0
9980 IF P3=2 THEN LET P6=1
9981 IF P3=3 THEN LET P6=0
9982 LET P9=INT(P8/32)
9983 LET P8=P8-(P9*32)+1
9984 LET P9=P9+1
9985 LET P4$=P1$[P9,P9],P3$[P8,P8]
9986 LET P9=INT(P7/32)
9987 LET P7=P7-(P9*32)+1
9988 LET P9=P9+1

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE 10
                  PROGRAM LISTING FOR ISCN09.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
9989 LET P4$=P4$,P1$[P9,P9],P2$[P7,P7]
9990 IF P6<>0 THEN GOTO 9992
9991 PRINT "<29>";
9992 PRINT P4$
9993 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 11
                    SYMBOL TABLE FOR ISCN09.AS

SYMBOL    REFERENCES
------  --------------------------------------------------------------

0040    4010
0080    0076  0096
0090    0078
0120    0094
0140    0098  0152
0250    0360  1086  1330  2180
0390    0312
1052    1002  1030
1070    1083
1088    1082
1100    1130
1130    1090
1230    1200
1340    1088
1820    1790
1830    1810
2150    2130
2210    0040  0088  0148  0270  1052  1078  1110  1150  2150
2220    2212
2240    2220
2260    2240
2310    2290
2320    2280
2340    2322
3000    0084  0144  1074
4500    1340
4600    0120  0992  2160  2270
9805    1450
9808    9813
9815    9809
9816    9819
9820    9816
9823    9826
9828    9823  9824
9831    9833
9835    9831
9881    2070
9896    9891
9908    9894
9924    1580  1610  1660  1690
9939    9929
9958    0130
9968    1420  1730  1870  1940  2060  9889  9927  9931  9933  9935
        9940  9942  9944
9972    9968
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 12
                    SYMBOL TABLE FOR ISCN09.AS

SYMBOL    REFERENCES
------  --------------------------------------------------------------

9992    9990
A$      0200  0580  0630  1073  1076  1080  1082  1083  2140
A1      0305  0850
A3      0305  0850
A9      0300  0305
B$      0200  0520  0560  0610  0630  1750  1760  1770  1800  1820
        1880
D$      0200  0220  0540  0550  0560  0570
D0$     0077  0086  0092  0094  0096  0992  1088  2270
D1      0260  0440  1510
D2      0260  0440  1510
D3      0260  0440  1510
D6      0305  0472  1512
D7      0305
E0      0300
E1      0300
E2      0020  0076  2280  4000
F       1250  1252  1270
F3$     0075  0390  1000  1170
F4$     0070  0240
FL#3    0390  0400  0410  0420  0440  0460  0480  0492  0570  0630
        0680  0700  0760  0810  0830  0850  0930  0980  0990  1000
        1020  1060  1170  1190  1230  2230
FL#4    0240  0260  0280  0290  0300  0305  0310  2214
FL#6    1140  1210  1240  1290  1300  1320  2250
H0      0300  0810  1260  1440  1790
I       0232  0234  0236  1010  1050  1180  1220  1270  1280  1290
        1300  1310  1760  1770  1780  1850  1860  1880  1890  1900
        1910  1950  1960  1970  1980  1990  2000  2080  2110
I0      0305  0830
I1      0305
I2      0305  0810
I3      0305  0930
L0      0300  0830  1260  1280  1430
L1      0050  0250  0312  0492  1512
L5      0146  0152  0312
M1      0305  0550
N1      0300
N2      0300  0760  1252  1270  1950  1970  1980  2010
P$      0066  0070  0075  0410  2282  2320
P1      1390  1700  1830  1910  2030  9887  9974  9936  9941  9943
        9969  9974
P1$     9958  9962  9985  9989
P2      1400  1710  1860  1920  2040  9888  9925  9932  9934  9945
        9970  9975
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                         PAGE 13
                        SYMBOL TABLE FOR ISCN09.AS

SYMBOL    REFERENCES
------   ------------------------------------------------------------------
 P2$     2282  2300  2320  2330  9958  9963  9989
 P3      1410  1720  1840  1930  2050  9882  9885  9926  9928  9968
         9980  9981
 P3$     9958  9964  9965  9966  9985
 P4      9959  9969  9974
 P4$     1740  1880  1950  9958  9973  9985  9989  9992
 P5      9960  9970  9975
 P6      9961  9980  9981  9990
 P7      9974  9976  9977  9986  9987  9989
 P8      9975  9978  9979  9982  9983  9985
 P9      9982  9983  9984  9985  9986  9987  9988  9989
 P[      0230  0234  1980  2030  9887  9892
 Q       0310
 Q$      0200  0220  0430  0440  0450  0460  0470  0480  0490  0492
         0510  0570  0600  0630  0670  0680  0690  0700  0710  0760
         0800  0810  0820  0830  0840  0850  0920  0930  1020  1040
         1190  1210
 Q1      1530  1670  9924
 Q1$     1020  1190
 Q2      1540  1590  1620  9925
 Q3      1550  1630  2010  9886  9930  9939
 Q4      1560  1640  9936  9945
 Q5      1570  1600  1650  1680  9929  9932  9934  9941  9943
 Q6      9930  9937  9939  9946
 Q7      2020  9885  9891
 Q8      9881  9890  9891  9895
 Q9      9886  9887  9888  9892  9893  9896
 Q[      0230  1280  1300  1990  2040  9888  9893
 R1$     0280  0460
 R2$     0280  0460
 R3$     0280
 R4$     0200  0280  0570
 R5$     0280
 S0$     0190  0192  0194  0196  0472  1512
 S1      1430  9808  9810  9820  9830  9831  9832  9836
 S2      1440  9808  9811
 S3      9808  9809  9816  9817  9820  9821  9823  9824  9825  9828
 S4      9815  9818  9828  9830  9832
 S5      9828  9831  9836
 S6      9835  9836  9837
 S7      9806  9812  9836
 S[      1880  1990  9805  9836
 T       1260  1280
 T0      1280  1300
 T1      0260  0440  1510
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                         PAGE 14
                        SYMBOL TABLE FOR ISCN09.AS

SYMBOL    REFERENCES
------   ------------------------------------------------------------------
 T2      0260  0440  1510
 T3      0260  0440
 U1      9892
 U2      9893
 V1      0305  0930
 V2      0305
 W1      0300  0492  1512
 Z1$     0290
 Z2$     0290
 Z3$     0290
 Z4$     0190  0290  0472  0480
 Z5      0300  0680
 Z5$     0190  0290  0480
 Z6      0300  0700
 Z7      0300  0700
 Z8      0300  0680
```

SECTION 13

ISCN.10 - TEMPORARY RUN FILE DEVELOPER

The temporary Run File developer program (ISCN.10) is the largest program in the standard calibration system. As its name implies, its purpose was to:

- temporarily serve as a Run File developer while other software[4] was being written to accomplish the task; and
- provide a means for non-SFC users to utilize the standard calibration instrument automation software system.

The foreground NOVA SFC system is capable of accessing backlog tables and creating wheel pattern templates for those who are performing automated instrument RUNs in an SFC compatible framework. Some users may not be involved in SFC and may want to avoid the complexities of the SFC system. For these users, the temporary Run File developer is the only means to define a Run File and thus, the only way to utilize the standard calibration instrument automation software system. For these analysts, the temporary Run File developer has been retained. Figure 15 shows the function and flow of the ISCN.10 program.

No templates are available to the analyst during Run File development so that the entire wheel must be completely defined in the session. Only one Run File may be generated at one time and the name of this file will always be '0000000.RF.' In addition, only one set of QC limits is maintained from one session to the next.

The program is composed of four distinct modules and one major subroutine. The modules are sequential and facilitate parameter definition, QC limit definition, wheel patern definition, and Run File output operations. The major subroutine is simply a number formatter.

The first step of the program is to read current QC limits and string parameters out of the QC limit file (ISCN.QC). If the file does not exist, it is created and filled with dummy parameters. The next step facilitates the entry of string parameters. The carriage return default feature is used to accept the last used parameters. The optional QC limit entry session module is straight forward.

The wheel pattern builder is the most complicated module in the ISCN.10 program. the module operates from a command line which facilitates the selection of one or more samples of a specific type for appendage to the wheel pattern. Calibration standards and unknowns may be specified in groups (N) while all other sample types require one entry per wheel position. Three QC sample types (F,C, and D) must be accompanied by a pointer (P) which references a previous sample containing the appropriate primary member of the QC set. Absolute wheel pattern referencing is used to relate secondary to primary QC samples.

The primary data accumulators in the wheel pattern builder are the W-array which holds numerical information and the U$ super-string which holds unknown identifiers. The W-array is structured such that its rows are equivalent to wheel positions (WO) and its columns specify sample type (W(WO,1)), primary QC member locator (W(WO,2)), known quantity W(WO,3)), and multiple duplicate counter (W(WO,4)) respectively. The W(WO,3) has an added value since it is also used to hold a flag indicating whether an unknown sample is spiked (W(WO,3)=1), duplicated (W,(WO,3)=2), or both spiked and duplicated (W(WO,3)=3). The super-string (U$) is filled by appending an eight character identifier string for each additional unknown in the wheel. Note that the "project code" contains the first four characters of all unknown identifiers while the last four characters are simply a right justified integer with padded zeros.

After a wheel pattern has been built, the program will take the resulting W-array, the identifier super-string, and the QC limit file (ISCN.QC) and produce a Run File. This process is generally uncomplicated except in the case where QC limit records must be inserted for an unknown which is both spiked and duplicated. The W(W1,4) flag determines the number and placement of these limit records.

Once the Run File has been produced, an output module lists the file to an appropriate output device. The main difference between this output module and those mentioned previously is that only 72 characters of each string are printed. A maximum page width of 72 characters is maintained throughout the system.

After the Run File has been produced and listed, the ISCN.10 program CHAINS the ISCN.00 program returning control to the ASCL. The Run File may then be used to perform a RUN. If an ESCape interrupts the ISCN.10 program at any time before it exits to the ASCL, the program is restarted from the beginning and any current pattern is lost.

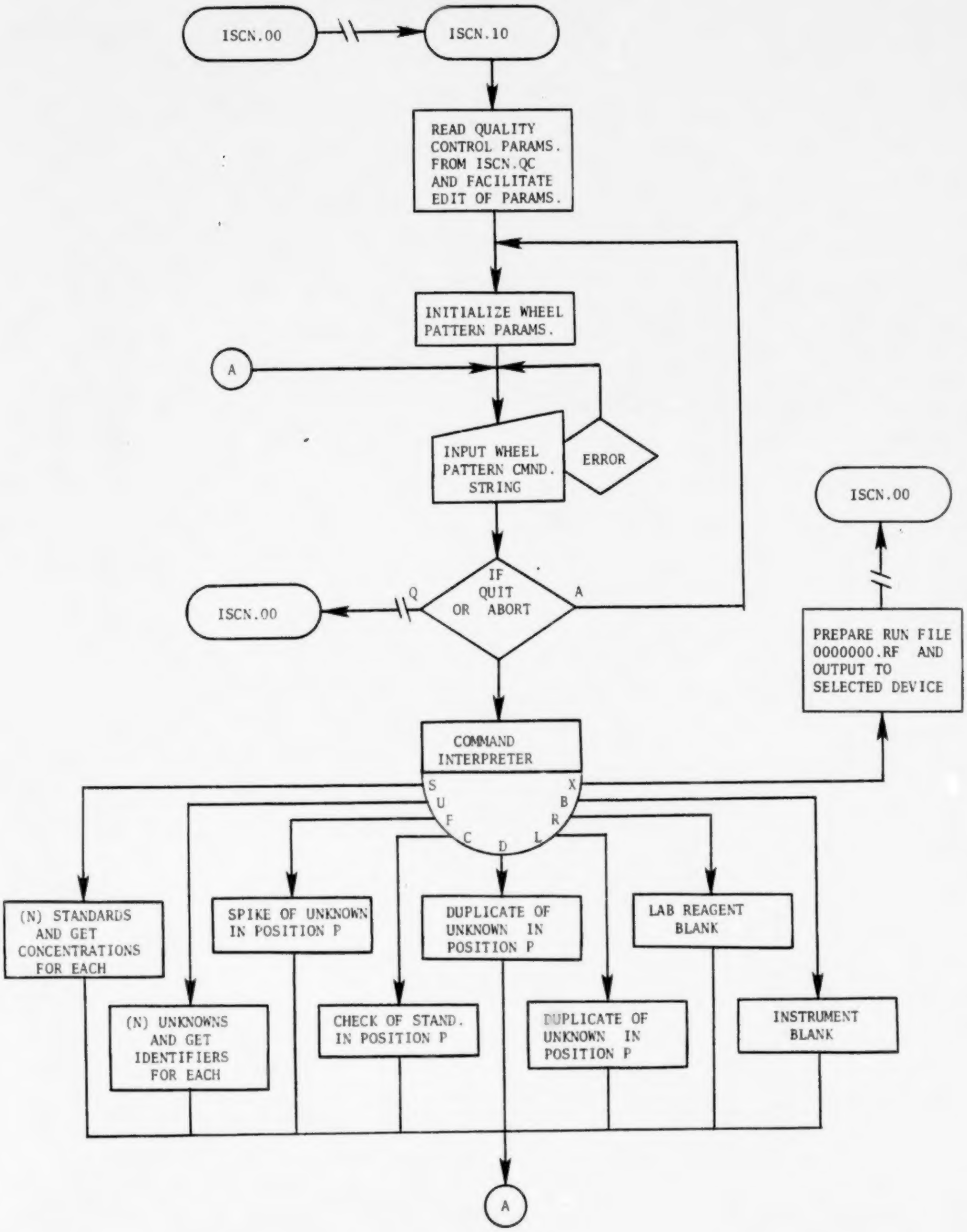
ISCN.00
ISCN.10
READ QUALITY CONTROL PARAMS. FROM ISCN.QC AND FACILITATE EDIT OF PARAMS.
INITIALIZE WHEEL PATTERN PARAMS.
A
INPUT WHEEL PATTERN CMND. STRING
ERROR
IF QUIT OR ABORT
Q
A
ISCN.00
ISCN.00
PREPARE RUN FILE 0000000.RF AND OUTPUT TO SELECTED DEVICE
COMMAND INTERPRETER
S
U
F
C
D
L
R
B
X
(N) STANDARDS AND GET CONCENTRATIONS FOR EACH
(N) UNKNOWNS AND GET IDENTIFIERS FOR EACH
SPIKE OF UNKNOWN IN POSITION P
CHECK OF STAND. IN POSITION P
DUPLICATE OF UNKNOWN IN POSITION P
DUPLICATE OF UNKNOWN IN POSITION P
LAB REAGENT BLANK
INSTRUMENT BLANK
A

Figure 15. Program ISCN.10 -- Temporary Run File creator.

TABLE 16 - SYMBOL DEFINITIONS FOR ISCN.10

A$	the user's response to a prompt
C	the sample-type identifier number
C$	the Run File development option string
C1$	the development option input string
D$	the number portion of the sample I.D. string
E	the error flag for the number formatter
E1	the error flag for the VALue routine
F2$	the name of the system QC limit file (non-SFC)
F7$	the name of the Run File
I	a counter
I$	the string representing a Run File record
I0$	the unknown identifier development flag
I2$	the header record format string
I3$	the null string starter for Run File Records
J	a counter
J1	the locator for the unknown identifier (in U$)
K	a counter
L	the length of the development option input string
L0	a string length variable
L1$	the project portion of the sample I.D. string
M5	the output option flag
N	the number of repeated standards or unknowns
N$	the string representing a formatted number
N1$	a string used in the number formatting routine
N2$	the exponent field of a formatted number
O$	the output option string
O1	the location of the output option in the option string
O1$	the response to the output option prompt
P	the QC pointer
P$	the prefix for programs and data files
P2	a pointer variable
P2$	the name of the program to be CHAINed to (.00)
Q$	the contents of a QC record in the Run File
Q0$	the QC limit edit flag
Q1$	a QC limit type string
Q2$	a QC limit type string (duplicates)
Q(	the QC limit array
R0$	the PARMETH code
R1$	the analyst's initials
R3$	the concentration units
S$	the instrument system name
S0	the calibration standards counter
S1$	a Run File record QC-code string

TYPING GUIDE SHEET
BEGIN FIRST LINE OF TEXT HERE
CENTER OF PAGE
TOP OF IMAGE AREA
DROPPED HEAD BEGIN SECTIONS HERE
BOTTOM OF IMAGE AREA; OUTSIDE DIMENSION FOR TABLES AND ILLUSTRATIONS
BEGIN LAST LINE OF TEXT
3/8"
PAGE NUMBER
EPA-287 (Cin.)
(4-76)

TABLE 16. (Contd.)

S2$	a Run File record QC-code string
U	the seed number for generated IDs
U$	the unknown identifier super-string
U1	the VALue of the number input for the unknown ID
U1$	the number input for an unknown ID
V	a number representing a QC limit
VO$	the number varifier string
W(	the wheel pattern storage array
WO	the wheel position counter
W1	a wheel position counter

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                  PAGE  1
                    PROGRAM LISTING FOR ISCN10.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
 0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
 0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
 0030 REM *   PROGRAM: ISCN.10 - CREATE RUN FILE WITHOUT BACKLOGEDIT  *
 0040 REM *   BY: D.RYAN (UCCC), SEPTEMBER 17, 1979                   *
 0050 REM *   MOST RECENT REVISION: DECEMBER 26, 1979                 *
 0060 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
 0070 DIM Q1$[15],Q2$[12],V0$[14]
 0080 DIM I$[80],I1$[80],I2$[80],I3$[80],Q$[80]
 0090 DIM U$[1000],C$[20],N$[10],N1$[20],S1$[30],S2$[15]
 0100 DIM W[125,4],Q[4,5]
 0110 LET S1$="T  S     LSFCS LD*LCMLRBB  "
 0120 LET S2$="   LSOLD1LDX"
 0130 LET Q1$="UCLUWLAVELWLLCL"
 0140 LET Q2$="A  B  C  D  "
 0150 LET I3$="
*                                 "
 0160 LET V0$="0123456789+-.E"
 0170 ON ESC THEN GOTO 0200
 0180 ESC
 0190 GOTO 0330
 0200 PRINT
 0210 CLOSE
 0220 PRINT "YOU WANT TO QUIT OR START OVER ? (Q[CR] OR S) ";
 0230 ON ERR THEN GOTO 6630
 0240 INPUT " > ",A$;
 0250 ON ERR THEN STOP
 0260 IF LEN(A[illegible]0 THEN GOTO 0310
 0270 IF A$="[illegible]THEN GOTO 0310
 0280 IF A$<[illegible]S" THEN GOTO 0240
 0290 GOTO 0330
 0300 REM **** EXIT SEGMENT ****
 0310 GOTO 6430
 0320 REM **********************
 0330 PRINT
 0340 CLOSE
 0350 PRINT "<7>THE TEMPORARY RUN FILE CREATOR IS AT YOUR SERVICE!<7>"
 0360 PRINT
 0370 PRINT "PLEASE ENTER INITIAL DATA!"
 0380 PRINT
 0390 ON ERR THEN GOTO 0410
 0400 RENAME "INST.NM","INST.NM"
 0410 ON ERR THEN STOP

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                  PAGE  2
                    PROGRAM LISTING FOR ISCN10.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
 0420 IF SYS(7)=-11 THEN GOTO 0470
 0430 IF SYS(7)=-9 THEN GOTO 0470
 0440 PRINT "<7>"
 0450 PRINT "<7>INST.NM IS NOT PRESENT!<7> PLEASE SEE SYSTEM MANAGER!<7
*     >"
 0460 BYE
 0470 OPEN FILE[1,3],"INST.NM"
 0480 LREAD FILE[1],S$
 0490 CLOSE FILE[1]
 0500 LET P$="ISCN"
 0510 RESTORE
 0520 DATA 122.5,115,100,85,77.5
 0530 DATA 2,1.5,.5,-.5,-1
 0540 DATA 0,0,1.5E-02,.5,0
 0550 DATA 115,110,100,90,85
 0560 LET R1$="NMN"
 0570 LET R0$="PARMETH"
 0580 LET R3$="UNITS"
 0590 LET L1$="PROJ"
 0600 FOR I=1 TO 4
 0610   FOR J=1 TO 5
 0620     READ Q[I,J]
 0630   NEXT J
 0640 NEXT I
 0650 LET F2$=P$,".QC"
 0660 LET F7$="0000000.RF"
 0670 LET P2$=P$,".00"
 0680 ON ERR THEN GOTO 0700
 0690 RENAME F2$,F2$
 0700 ON ERR THEN STOP
 0710 IF SYS(7)=-9 THEN GOTO 0790
 0720 IF SYS(7)<>-10 THEN STOP
 0730 OPEN FILE[2,0],F2$
 0740 WRITE FILE[2,0],R1$,R0$,R3$,L1$,P$
 0750 FOR J=1 TO 4
 0760   GOSUB 6670
 0770 NEXT J
 0780 CLOSE FILE[2]
 0790 OPEN FILE[2,0],F2$
 0800 READ FILE[2,0],R1$,R0$,R3$,L1$,P$
 0810 FOR J=1 TO 4
 0820   GOSUB 6650

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

TYPING GUIDE SHEET

```
123456789112345678921234567893123456789412345678951234567896123456789 7
        0          0          0          0          0          0        0
0830 NEXT J
0840 CLOSE FILE[2]
0850 ON ERR THEN GOTO 6630
0860 PRINT "YOUR INITIALS (3) - [";R1$;"]";
0870 INPUT " > ",A$;
0880 IF LEN(A$)<>0 THEN GOTO 0910
0890 PRINT
0900 GOTO 0940
0910 IF LEN(A$)<>3 THEN GOTO 0870
0920 LET R1$=A$
0930 PRINT
0940 PRINT "PARMETH CODE (7)  - [";R0$;"]";
0950 INPUT " > ",A$;
0960 IF LEN(A$)<>0 THEN GOTO 0990
0970 PRINT
0980 GOTO 1020
0990 IF LEN(A$)<>7 THEN GOTO 0950
1000 LET R0$=A$
1010 PRINT
1020 PRINT "UNITS (UG OR MG/L)- [";R3$;"]";
1030 INPUT " > ",A$;
1040 IF LEN(A$)<>0 THEN GOTO 1070
1050 PRINT
1060 GOTO 1120
1070 IF LEN(A$)>2 THEN IF LEN(A$)<9 THEN GOTO 1100
1080 PRINT "<7><7>";
1090 GOTO 1030
1100 LET R3$=A$
1110 PRINT
1120 PRINT "PROJECT CODE (4)  - [";L1$;"]";
1130 INPUT " > ",A$;
1140 IF LEN(A$)<>0 THEN GOTO 1170
1150 PRINT
1160 GOTO 1200
1170 IF LEN(A$)<>4 THEN GOTO 1130
1180 LET L1$=A$
1190 PRINT
1200 ON ERR THEN STOP
1210 PRINT
1220 PRINT "MISTAKES ON PRELIMINARY DATA ? ([N] OR Y) ";
1230 ON ERR THEN GOTO 6630
1240 INPUT "> ",A$;

123456789112345678921234567893123456789412345678951234567896123456789 7
        0          0          0          0          0          0        0
```

```
123456789112345678921234567893123456789412345678951234567896123456789 7
        0          0          0          0          0          0        0
1250 ON ERR THEN STOP
1260 PRINT
1270 IF LEN(A$)=0 THEN GOTO 1310
1280 IF A$="N" THEN GOTO 1310
1290 IF A$<>"Y" THEN GOTO 1210
1300 GOTO 0330
1310 OPEN FILE[2,0],F2$
1320 WRITE FILE[2,0],R1$,R0$,R3$,L1$,P$
1330 FOR J=1 TO 4
1340   GOSUB 6670
1350 NEXT J
1360 PRINT
1370 PRINT "DEFAULT-TO-OLD OR ENTER-NEW QC LIMITS ? ([D] OR E) ";
1380 ON ERR THEN GOTO 6630
1390 INPUT "> ",Q0$;
1400 ON ERR THEN STOP
1410 PRINT
1420 IF LEN(Q0$)=0 THEN GOTO 2400
1430 IF Q0$="D" THEN GOTO 2400
1440 IF Q0$<>"E" THEN GOTO 1360
1450 LET J=1
1460 GOSUB 6650
1470 PRINT
1480 PRINT "FOR LABORATORY SPIKES:"
1490 GOSUB 6980
1500 FOR I=2 TO 5
1510   IF Q[J,I-1]<Q[J,I] THEN GOTO 1540
1520 NEXT I
1530 GOTO 1560
1540 PRINT "ENTRY ERROR"
1550 GOTO 1450
1560 PRINT "MISTAKES ON SPIKE LIMITS ? ([N] OR Y) ";
1570 ON ERR THEN GOTO 6630
1580 INPUT "> ",A$;
1590 ON ERR THEN STOP
1600 PRINT
1610 IF LEN(A$)=0 THEN GOTO 1650
1620 IF A$="N" THEN GOTO 1650
1630 IF A$<>"Y" THEN GOTO 1570
1640 GOTO 1450
1650 GOSUB 6670
1660 LET J=2

123456789112345678921234567893123456789412345678951234567896123456789 7
        0          0          0          0          0          0        0
```

```
 STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                             PAGE  5
                  PROGRAM LISTING FOR ISCN10.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1670 GOSUB 6650
1680 PRINT
1690 PRINT "FOR LABORATORY REAGENT BLANKS:"
1700 GOSUB 6980
1710 FOR I=2 TO 5
1720   IF Q[J,I-1]<Q[J,I] THEN GOTO 1750
1730 NEXT I
1740 GOTO 1770
1750 PRINT "ENTRY ERROR"
1760 GOTO 1660
1770 PRINT "MISTAKES ON REAGENT BLANK LIMITS ? ([N] OR Y) ";
1780 ON ERR THEN GOTO 6630
1790 INPUT "> ",A$;
1800 ON ERR THEN STOP
1810 PRINT
1820 IF LEN(A$)=0 THEN GOTO 1860
1830 IF A$="N" THEN GOTO 1860
1840 IF A$<>"Y" THEN GOTO 1780
1850 GOTO 1660
1860 GOSUB 6670
1870 LET J=3
1880 GOSUB 6650
1890 PRINT
1900 PRINT "FOR LABORATORY DUPLICATES:"
1910 PRINT
1920 PRINT "SLOPE    - [";Q[J,3];"]";
1930 GOSUB 6500
1940 IF E1=1 THEN GOTO 1960
1950 LET Q[J,3]=V
1960 PRINT "INTERCEPT- [";Q[J,4];"]";
1970 GOSUB 6500
1980 IF E1=1 THEN GOTO 2000
1990 LET Q[J,4]=V
2000 IF Q[J,3]>=0 THEN IF Q[J,4]>=0 THEN GOTO 2060
2010 PRINT "ENTRY ERROR"
2020 GOTO 1870
2030 LET Q[J,1]=0
2040 LET Q[J,2]=0
2050 LET Q[J,5]=0
2060 PRINT
2070 PRINT "R = XBAR *";Q[3,3];"+";Q[3,4]
2080 PRINT

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
 STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                             PAGE  6
                  PROGRAM LISTING FOR ISCN10.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2090 PRINT "MISTAKES ON DUPLICATE PARAMETERS ? ([N] OR Y) ";
2100 ON ERR THEN GOTO 6630
2110 INPUT "> ",A$;
2120 ON ERR THEN STOP
2130 PRINT
2140 IF LEN(A$)=0 THEN GOTO 2180
2150 IF A$="N" THEN GOTO 2180
2160 IF A$<>"Y" THEN GOTO 2080
2170 GOTO 1870
2180 GOSUB 6670
2190 LET J=4
2200 GOSUB 6650
2210 PRINT
2220 PRINT "FOR LABORATORY CONTROL STANDARDS:"
2230 GOSUB 6980
2240 FOR I=2 TO 5
2250   IF Q[J,I-1]<Q[J,I] THEN GOTO 2280
2260 NEXT I
2270 GOTO 2310
2280 PRINT "ENTRY ERROR"
2290 GOSUB 6650
2300 GOTO 2190
2310 PRINT "MISTAKES ON CONTROL STANDARD LIMITS ? ([N] OR Y) ";
2320 ON ERR THEN GOTO 6630
2330 INPUT "> ",A$;
2340 ON ERR THEN STOP
2350 PRINT
2360 IF LEN(A$)=0 THEN GOTO 2400
2370 IF A$="N" THEN GOTO 2400
2380 IF A$<>"Y" THEN GOTO 2320
2390 GOTO 2190
2400 GOSUB 6670
2410 CLOSE FILE[2]
2420 ON ESC THEN GOTO 0200
2430 MAT W=ZER
2440 LET U$=""
2450 PRINT
2460 PRINT "PREPARE TO BUILD YOUR WHEEL PATTERN!"
2470 PRINT
2480 PRINT "GENERATE OR ENTER ID'S ? ([G] OR E) ";
2490 ON ERR THEN GOTO 6630
2500 INPUT "> ",IO$;

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

EPA Form 2350-4 (4-80)

TYPING GUIDE SHEET

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2510 ON ERR THEN STOP
2520 PRINT
2530 IF I0$="E" THEN GOTO 2640
2540 IF I0$="G" THEN GOTO 2548
2542 IF LEN(I0$)=0 THEN GOTO 2548
2544 PRINT "<7>";
2546 GOTO 2470
2548 PRINT
2550 PRINT "SEED NUMBER FOR UNKNOWN IDS. ";
2560 ON ERR THEN GOTO 6630
2570 INPUT "> ",U;
2580 ON ERR THEN STOP
2590 PRINT
2600 LET U=U-1
2610 IF ABS(U)<=9999 THEN IF ABS(INT(U))=U THEN GOTO 2640
2620 PRINT "<7>";
2630 GOTO 2548
2640 LET W0=0
2650 LET U0=0
2660 LET S0=0
2670 LET C$="HSUFCDLRBXAQ"
2680 GOTO 2830
2690 PRINT
2700 PRINT "<7>BAD COMMAND!"
2710 GOTO 2830
2720 PRINT "  [N]S    - CALIBRATION STANDARDS (EG. 5S)"
2730 PRINT "  [N]U    - UNKNOWN SAMPLES (EG. 10U)"
2740 PRINT "     F[P] - SPIKED UNKNOWN (EG. F9)"
2750 PRINT "     C[P] - CHECK STANDARD (EG. C5)"
2760 PRINT "     D[P] - DUPLICATE UNKNOWN (EG. D8)"
2770 PRINT "     L    - CONTROL STANDARD"
2780 PRINT "     R    - REAGENT BLANK"
2790 PRINT "     B    - INSTRUMENT BASELINE BLANK"
2800 PRINT "     X    - EXIT SESSION SUCCESSFULLY"
2810 PRINT "     A    - ABORT/RESTART PATTERN BUILDER"
2820 PRINT "     Q    - QUIT (#$%&+*) GIVE-UP"
2830 PRINT
2840 PRINT "RUN FILE DEVELOPMENT OPTIONS: ([H]SUFCDLRBXAQ) ";
2850 ON ERR THEN GOTO 6630
2860 INPUT "> ",C1$;
2870 ON ERR THEN STOP
2880 PRINT

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2890 IF C1$="Q" THEN GOTO 6430
2900 LET N=0
2910 LET P=0
2920 LET L=LEN(C1$)
2930 IF L=0 THEN GOTO 2720
2940 FOR I=1 TO L
2950   FOR J=1 TO LEN(C$)
2960     IF C$[J,J]=C1$[I,I] THEN GOTO 3000
2970   NEXT J
2980 NEXT I
2990 GOTO 2690
3000 LET C=J-1
3010 LET C1=I
3020 ON ERR THEN GOTO 3040
3030 LET N=VAL(C1$[1,I])
3040 ON ERR THEN GOTO 3060
3050 LET P=VAL(C1$[I+1,L])
3060 ON ERR THEN STOP
3070 LET L0=1
3080 IF N<>0 THEN LET L0=L0+LEN(STR$(ABS(INT(N))))
3090 IF P<>0 THEN LET L0=L0+LEN(STR$(ABS(INT(P))))
3100 IF L<>L0 THEN GOTO 2690
3110 IF N=0 THEN LET N=1
3120 PRINT
3130 ON C+1 THEN GOTO 2720, 3220, 3480, 3930, 4040, 4140, 4280, 4390,
*    4450, 4510, 2420
3140 GOTO 2690
3150 IF P<>0 THEN GOTO 2690
3160 FOR K=1 TO N
3170   LET W0=W0+1
3180   LET W[W0,1]=C
3190   PRINT USING "WHEEL POS ### ",W0
3200 NEXT K
3210 GOTO 2830
3220 IF P<>0 THEN GOTO 2690
3230 FOR K=1 TO N
3240   LET W0=W0+1
3250   LET W[W0,1]=C
3260   LET S0=S0+1
3270   LET W[W0,2]=S0
3280   PRINT USING "FOR WHEEL POS ###     STD CONC = ",W0;
3290   GOSUB 6500

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3300   LET W[W0,3]=V
3310   IF V<0 THEN GOTO 3330
3320   IF E1=0 THEN GOTO 3350
3330   PRINT "ERROR<7>"
3340   GOTO 3280
3350 NEXT K
3360 PRINT
3370 PRINT "MISTAKES ON CALIBRATION STANDARD VALUES ? ([N] OR Y) ",;
3380 ON ERR THEN GOTO 6630
3390 INPUT "> ",A$;
3400 ON ERR THEN STOP
3410 PRINT
3420 IF A$<>"N" THEN IF A$<>"" THEN GOTO 3440
3430 GOTO 3470
3440 LET W0=W0-N
3450 LET S0=S0-N
3460 GOTO 3230
3470 GOTO 2830
3480 IF P<>0 THEN GOTO 2690
3490 FOR K=1 TO N
3500   LET W0=W0+1
3510   LET W[W0,1]=C
3520   LET U0=U0+1
3530   LET W[W0,2]=U0
3540   PRINT USING "WHEEL POS ###     SAMPLE ID > ",W0;
3550   LET D$="0000"
3560   IF I0$<>"E" THEN GOTO 3730
3570   ON ERR THEN GOTO 6630
3580   INPUT "",U1$;
3590   ON ERR THEN STOP
3600   GOTO 3630
3610   PRINT "<7> >";
3620   GOTO 3570
3630   IF LEN(U1$)>0 THEN IF LEN(U1$)<5 THEN GOTO 3650
3640   GOTO 3610
3650   FOR I=1 TO LEN(U1$)
3660     LET J=POS(V0$[1,10],U1$[I,I],1)
3670     IF J=0 THEN GOTO 3610
3680   NEXT I
3690   PRINT
3700   LET U1=VAL(U1$)
3710   LET D$[5-LEN(STR$(U1)),4]=STR$(U1)

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3720   GOTO 3760
3730   LET U=U+1
3740   IF U=10000 THEN LET U=1
3750   LET D$[5-LEN(STR$(U)),4]=STR$(U)
3760   LET U$[(U0-1)*8+1,U0*8]=L1$,D$
3770   PRINT U$[(U0-1)*8+1,U0*8]
3780 NEXT K
3790 IF I0$<>"E" THEN GOTO 3920
3800 PRINT
3810 PRINT "MISTAKES ON SAMPLE IDENTIFIERS ? ([N] OR Y) ";
3820 ON ERR THEN GOTO 6630
3830 INPUT "> ",A$;
3840 ON ERR THEN STOP
3850 PRINT
3860 IF A$<>"N" THEN IF A$<>"" THEN GOTO 3880
3870 GOTO 3920
3880 IF A$<>"Y" THEN GOTO 3810
3890 LET W0=W0-N
3900 LET U0=U0-N
3910 GOTO 3490
3920 GOTO 2830
3930 IF N<>1 THEN GOTO 2690
3940 IF P<1 THEN GOTO 2690
3950 IF W[P,1]<>2 THEN GOTO 2690
3960 LET W[P,2]=-ABS(W[P,2])
3970 LET W0=W0+1
3980 LET W[W0,1]=C
3990 LET W[W0,2]=P
4000 IF W[P,3]=0 THEN LET W[P,3]=1
4010 IF W[P,3]=2 THEN LET W[P,3]=3
4020 PRINT USING "WHEEL POS ###",W0
4030 GOTO 2830
4040 IF N<>1 THEN GOTO 2690
4050 IF P<1 THEN GOTO 2690
4060 IF W[P,1]<>1 THEN GOTO 2690
4070 LET W[P,2]=-ABS(W[P,2])
4080 LET W0=W0+1
4090 LET W[W0,1]=C
4100 LET W[W0,2]=P
4110 LET W[W0,3]=W[P,3]
4120 PRINT USING "WHEEL POS ### ",W0
4130 GOTO 2830

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN10.AS

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4140 IF N<>1 THEN GOTO 2690
4150 IF P<1 THEN GOTO 2690
4160 IF W[P,1]<>2 THEN GOTO 2690
4170 IF W[P,4]+1>9 THEN GOTO 2690
4180 LET W[P,2]=-ABS(W[P,2])
4190 LET W0=W0+1
4200 LET W[W0,1]=C
4210 LET W[W0,2]=P
4220 LET W[P,4]=W[P,4]+1
4230 LET W[W0,4]=W[P,4]
4240 IF W[P,3]=0 THEN LET W[P,3]=2
4250 IF W[P,3]=1 THEN LET W[P,3]=3
4260 PRINT USING "WHEEL POS ### ",W0
4270 GOTO 2830
4280 IF N<>1 THEN GOTO 2690
4290 IF P<>0 THEN GOTO 2690
4300 LET W0=W0+1
4310 LET W[W0,1]=C
4320 PRINT USING "WHEEL POS ###    CTL STD CONC = ",W0;
4330 GOSUB 6500
4340 LET W[W0,3]=V
4350 IF E1=0 THEN GOTO 4380
4360 PRINT "ERROR<7>"
4370 GOTO 4320
4380 GOTO 2830
4390 IF N<>1 THEN GOTO 2690
4400 IF P<>0 THEN GOTO 2690
4410 LET W0=W0+1
4420 LET W[W0,1]=C
4430 PRINT USING "WHEEL POS ### ",W0
4440 GOTO 2830
4450 IF N<>1 THEN GOTO 2690
4460 IF P<>0 THEN GOTO 2690
4470 LET W0=W0+1
4480 LET W[W0,1]=C
4490 PRINT USING "WHEEL POS ### ",W0
4500 GOTO 2830
4510 NOESC
4520 OPEN FILE[7,1],F7$,80
4530 LET I2$="1 ## ## ## ## ## ##### ####### ### "
4540 FOR I=1 TO 9
4550   LET I2$=I2$,"    "

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN10.AS

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4560 NEXT I
4570 PRINT FILE[7],USING I2$,SYS(3)-1900,SYS(2),SYS(1),SYS(11),SYS(12)
*     ,S$,R0$,R1$
4580 LET W1=0
4590 LET W1=W1+1
4600 IF W1>W0 THEN GOTO 5860
4610 ON W[W1,1]+1 THEN GOTO 4650, 4650, 4780, 4780, 4650, 4780, 5370,
*     5370, 4650
4620 PRINT "<7>ERROR"
4630 GOTO 4590
4640 REM CAL STANDARDS, CHECK STANDARDS, AND INTS. BLANKS
4650 LET I$=I3$
4660 LET I$[1,1]="3"
4670 IF W[W1,1]=8 THEN GOTO 4720
4680 IF W[W1,1]=0 THEN GOTO 4720
4690 LET N=W[W1,3]
4700 GOSUB 6700
4710 LET I$[5,14]=N$
4720 LET I$[20,26]=R0$
4730 LET I$[16,16]="P"
4740 LET I$[39,41]=S1$[W[W1,1]*3+1,(W[W1,1]+1)*3]
4750 PRINT FILE[7],I$
4760 GOTO 4590
4770 REM UNKNOWNS, SPIKES, AND DUPLICATES
4780 LET I$=I3$
4790 LET I$[20,26]=R0$
4800 LET I$[16,16]="P"
4810 LET I$[39,38+LEN(R3$)]=R3$
4820 LET I$[1,1]="2"
4830 IF W[W1,1]<>2 THEN GOTO 4890
4840 LET I$[12,14]=S2$[W[W1,3]*3+1,(W[W1,3]+1)*3]
4850 LET I$[61,65]="BKNUM"
4860 LET I$[52,59]="SFCRECNO"
4870 LET J1=ABS(W[W1,2])
4880 GOTO 4920
4890 LET I$[12,14]=S1$[(W[W1,1])*3+1,(W[W1,1]+1)*3]
4900 LET P2=W[W1,2]
4910 LET J1=ABS(W[P2,2])
4920 LET I$[3,10]=U$[(J1-1)*8+1,J1*8]
4930 IF W[W1,1]=5 THEN LET I$[14,14]=STR$(W[W1,4]+1)
4940 PRINT FILE[7],I$
4950 REM LDN'S GO BACK HERE

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 13
                  PROGRAM LISTING FOR ISCN10.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
4960 IF W[W1,1]=5 THEN GOTO 4590
4970 IF W[W1,1]<>3 THEN GOTO 5030
4980 LET I$[12,14]="LSA"
4990 PRINT FILE[7],I$
5000 REM LSF'S GO BACK HERE
5010 GOTO 4590
5020 REM UNK'S WITHOUT QC GO BACK HERE
5030 IF W[W1,2]>0 THEN GOTO 4590
5040 IF W[W1,1]<>2 THEN STOP
5050 REM QC RECORDS FOR UNKNOWNS
5060 LET Q$=I3$
5070 LET Q$[1,1]="4"
5080 LET Q$[20,26]=R0$
5090 LET Q$[16,16]="P"
5100 LET Q$[39,46]="MM/DD/YY"
5110 ON W[W1,3] THEN GOTO 5130, 5130, 5130
5120 STOP
5130 IF W[W1,3]=2 THEN GOTO 5250
5140 REM SPIKE QC RECORDS HERE
5150 LET Q$[3,6]="LSPK"
5160 LET J=1
5170 FOR I=1 TO 5
5180   LET Q$[12,14]=Q1$[(I-1)*3+1,I*3]
5190   LET N=Q[J,I]
5200   GOSUB 6700
5210   LET Q$[28,37]=N$
5220   PRINT FILE[7],Q$
5230 NEXT I
5240 REM DUPLICATE QC RECORDS HERE
5250 IF W[W1,3]=1 THEN GOTO 4590
5260 LET Q$[3,6]="LDUP"
5270 LET J=3
5280 FOR I=1 TO 4
5290   LET Q$[12,14]=Q2$[(I-1)*3+1,I*3]
5300   LET N=Q[J,I]
5310   GOSUB 6700
5320   LET Q$[28,37]=N$
5330   PRINT FILE[7],Q$
5340 NEXT I
5350 GOTO 4590
5360 REM LAB CONTROL STDS AND LAB REAGENT BLANKS
5370 LET I$=I3$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                        PAGE 14
                  PROGRAM LISTING FOR ISCN10.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
5380 LET I$[20,26]=R0$
5390 LET I$[16,16]="P"
5400 LET I$[39,38+LEN(R3$)]=R3$
5410 LET I$[1,1]="2"
5420 IF W[W1,1]=6 THEN GOTO 5620
5430 LET I$[12,14]="LRB"
5440 PRINT FILE[7],I$
5450 REM QC FOR LRB
5460 LET Q$=I3$
5470 LET Q$[1,1]="4"
5480 LET Q$[20,26]=R0$
5490 LET Q$[16,16]="P"
5500 LET Q$[39,46]="MM/DD/YY"
5510 LET Q$[3,6]="LRBL"
5520 LET J=2
5530 FOR I=1 TO 5
5540   LET Q$[12,14]=Q1$[(I-1)*3+1,I*3]
5550   LET N=Q[J,I]
5560   GOSUB 6700
5570   LET Q$[28,37]=N$
5580   PRINT FILE[7],Q$
5590 NEXT I
5600 GOTO 4590
5610 REM LAB CONTROL STDS
5620 LET I$[12,14]="LCM"
5630 PRINT FILE[7],I$
5640 LET N=W[W1,3]
5650 GOSUB 6700
5660 LET I$[28,37]=N$
5670 LET I$[12,14]="LCT"
5680 PRINT FILE[7],I$
5690 REM QC RECORDS FOR CONTROL STDS
5700 LET Q$=I3$
5710 LET Q$[1,1]="4"
5720 LET Q$[20,26]=R0$
5730 LET Q$[16,16]="P"
5740 LET Q$[39,46]="MM/DD/YY"
5750 LET Q$[3,6]="LCST"
5760 LET J=4
5770 FOR I=1 TO 5
5780   LET Q$[12,14]=Q1$[(I-1)*3+1,I*3]
5790   LET N=Q[J,I]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
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    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                  PAGE 15
                  PROGRAM LISTING FOR ISCN10.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
 5800   GOSUB 6700
 5810   LET Q$[28,37]=N$
 5820   PRINT FILE[7],Q$
 5830 NEXT I
 5840 GOTO 4590
 5850 REM DISPLAY SEGMENT
 5860 CLOSE FILE[7]
 5870 PRINT
 5880 PRINT "YOUR RUN FILE NAME IS ";F7$
 5890 ON ESC THEN GOTO 6430
 5900 ESC
 5910 PRINT
 5920 LET O$="HTLBN"
 5930 PRINT "RUN FILE OUTPUT OPTIONS: ([H]TLBN) ";
 5940 ON ERR THEN GOTO 6630
 5950 INPUT " > ",O1$;
 5960 ON ERR THEN STOP
 5970 PRINT
 5980 IF LEN(O1$)=0 THEN GOTO 6050
 5990 IF O1$="H" THEN GOTO 6050
 6000 IF LEN(O1$)<>1 THEN GOTO 6030
 6010 LET O1=POS(O$,O1$,1)
 6020 IF O1>1 THEN GOTO 6100
 6030 PRINT "<7>";
 6040 GOTO 5910
 6050 PRINT "   T - TERMINAL OUTPUT ONLY"
 6060 PRINT "   L - LINEPRINTER OUTPUT ONLY"
 6070 PRINT "   B - BOTH TERMINAL AND LINEPRINTER OUTPUT"
 6080 PRINT "   N - NO REPORT GENERATED"
 6090 GOTO 5910
 6100 LET M5=O1-2
 6110 IF M5=3 THEN GOTO 6430
 6120 IF M5=0 THEN GOTO 6320
 6130 OPEN FILE[7,3],F7$,80
 6140 GOTO 6180
 6150 PRINT "X";
 6160 IF SYS(7)<>-48 THEN STOP
 6170 DELAY =2.3
 6180 ON ERR THEN GOTO 6150
 6190 OPEN FILE[6,1],"$LPT"
 6200 ON ERR THEN STOP
 6210 PRINT FILE[6]

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

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    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                  PAGE 16
                  PROGRAM LISTING FOR ISCN10.AS

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
 6220 PRINT FILE[6],"RUN FILE ";F7$;"   ";SYS(11);":";SYS(12);"   ";SYS
*     (2);"/";SYS(1);"/";SYS(3)
 6230 PRINT FILE[6]
 6240 FOR I=1 TO 1000
 6250   LREAD FILE[7],I$,I0$
 6260   IF EOF(7)=1 THEN GOTO 6290
 6270   PRINT FILE[6],I$[1,72]
 6280 NEXT I
 6290 CLOSE FILE[6]
 6300 CLOSE FILE[7]
 6310 IF M5=1 THEN GOTO 6430
 6320 PRINT
 6330 PRINT "RUN FILE ";F7$;"   ";SYS(11);":";SYS(12);"   ";SYS(2);"/"
*     ;SYS(1);"/";SYS(3)
 6340 OPEN FILE[7,3],F7$,80
 6350 PRINT
 6360 FOR I=1 TO 1000
 6370   LREAD FILE[7],I$,I0$
 6380   IF EOF(7)=1 THEN GOTO 6410
 6390   PRINT I$[1,72]
 6400 NEXT I
 6410 PRINT
 6420 CLOSE FILE[7]
 6430 NOESC
 6440 CLOSE
 6450 ON ERR THEN GOTO 6470
 6460 CHAIN P2$
 6470 ON ERR THEN STOP
 6480 ESC
 6490 STOP
 6500 LET E1=0
 6510 LET V=0
 6520 ON ERR THEN GOTO 6630
 6530 INPUT " > ",V$;
 6540 ON ERR THEN STOP
 6550 IF LEN(V$)=0 THEN GOTO 6600
 6560 ON ERR THEN GOTO 6510
 6570 LET V=VAL(V$)
 6580 ON ERR THEN STOP
 6590 GOTO 6610
 6600 LET E1=1
 6610 PRINT

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                 PAGE 17
                  PROGRAM LISTING FOR ISCN10.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
6620 RETURN
6630 PRINT ">(7> ";
6640 RETRY
6650 READ FILE[2,J],Q[J,1],Q[J,2],Q[J,3],Q[J,4],Q[J,5]
6660 RETURN
6670 WRITE FILE[2,J],Q[J,1],Q[J,2],Q[J,3],Q[J,4],Q[J,5]
6680 RETURN
6690 REM SUBROUTINE TO FORMAT KNOWN VALUES AS +#.###E+##
6700 LET E=0
6710 LET N$="+0.000E+00"
6720 IF N=0 THEN GOTO 6950
6730 REM GET SIGN OF NUMBER
6740 IF N<0 THEN LET N$[1,1]="-"
6750 LET N=ABS(N)
6760 REM IF LESS THAN 1 THEN MULTIPLY BY 10
6770 IF N<.9995 THEN GOTO 6790
6780 GOTO 6840
6790 LET N=N*10
6800 LET N$[8,8]="-"
6810 LET E=E+1
6820 GOTO 6770
6830 REM IF N>=10 THEN DIVIDE BY 10
6840 IF N<9.9995 THEN GOTO 6890
6850 LET N=N/10
6860 LET N$[8,8]="+"
6870 GOTO 6810
6880 REM ROUND UP AND FORMAT AS #.###
6890 LET N=N+5E-04
6900 LET N1$=STR$(N)
6910 IF LEN(N1$)>5 THEN LET N1$=N1$[1,5]
6920 LET N$[2,LEN(N1$)+1]=N1$
6930 GOTO 6950
6940 REM PUT IN EXPONENT FIELD
6950 LET N2$=STR$(E)
6960 LET N$[11-LEN(N2$),10]=N2$
6970 RETURN
6980 PRINT
6990 PRINT "UCL - [";Q[J,1];"]";
7000 GOSUB 6500
7010 IF E1=1 THEN GOTO 7030
7020 LET Q[J,1]=V
7030 PRINT "UWL - [";Q[J,2];"]";

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                 PAGE 18
                  PROGRAM LISTING FOR ISCN10.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
7040 GOSUB 6500
7050 IF E1=1 THEN GOTO 7070
7060 LET Q[J,2]=V
7070 PRINT "MEAN- [";Q[J,3];"]";
7080 GOSUB 6500
7090 IF E1=1 THEN GOTO 7110
7100 LET Q[J,3]=V
7110 PRINT "LWL - [";Q[J,4];"]";
7120 GOSUB 6500
7130 IF E1=1 THEN GOTO 7150
7140 LET Q[J,4]=V
7150 PRINT "LCL - [";Q[J,5];"]";
7160 GOSUB 6500
7170 IF E1=1 THEN GOTO 7190
7180 LET Q[J,5]=V
7190 RETURN

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

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    STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                  PAGE 19
                   SYMBOL TABLE FOR ISCN10.AS

SYMBOL   REFERENCES
------   ----------------------------------------------------------

 0200   0170  2420
 0240   0280
 0310   0260  0270
 0330   0190  0290  1300
 0410   0390
 0470   0420  0430
 0700   0680
 0790   0710
 0870   0910
 0910   0880
 0940   0900
 0950   0990
 0990   0960
 1020   0980
 1030   1090
 1070   1040
 1100   1070
 1120   1060
 1130   1170
 1170   1140
 1200   1160
 1210   1290
 1310   1270  1280
 1360   1440
 1450   1550  1640
 1540   1510
 1560   1530
 1570   1630
 1650   1610  1620
 1660   1760  1850
 1750   1720
 1770   1740
 1780   1840
 1860   1820  1830
 1870   2020  2170
 1960   1940
 2000   1980
 2060   2000
 2080   2160
 2180   2140  2150
 2190   2300  2390
 2280   2250
 2310   2270
 2320   2380
 2400   1420  1430  2360  2370
```

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    STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                  PAGE 20
                   SYMBOL TABLE FOR ISCN10.AS

SYMBOL   REFERENCES
------   ----------------------------------------------------------

 2420   3130
 2470   2546
 2548   2540  2542  2630
 2640   2530  2610
 2690   2990  3100  3140  3150  3220  3480  3930  3940  3950  4040
        4050  4060  4140  4150  4160  4170  4280  4290  4390  4400
        4450  4460
 2720   2930  3130
 2830   2680  2710  3210  3470  3920  4030  4130  4270  4380  4440
        4500
 3000   2960
 3040   3020
 3060   3040
 3220   3130
 3230   3460
 3280   3340
 3330   3310
 3350   3320
 3440   3420
 3470   3430
 3480   3130
 3490   3910
 3570   3620
 3610   3640  3670
 3630   3600
 3650   3630
 3730   3560
 3760   3720
 3810   3880
 3880   3860
 3920   3790  3870
 3930   3130
 4040   3130
 4140   3130
 4280   3130
 4320   4370
 4380   4350
 4390   3130
 4450   3130
 4510   3130
 4590   4630  4760  4960  5010  5030  5250  5350  5600  5840
 4650   4610
 4720   4670  4680
 4780   4610
 4890   4830
```

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        STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                           PAGE 21
                      SYMBOL TABLE FOR ISCN10.AS

SYMBOL    REFERENCES
------   ---------------------------------------------------------------------
  4920   4880
  5030   4970
  5130   5110
  5250   5130
  5370   4610
  5620   5420
  5860   4600
  5910   6040   6090
  6030   6000
  6050   5980   5990
  6100   6020
  6150   6180
  6180   6140
  6290   6260
  6320   6120
  6410   6380
  6430   0310   2890   5890   6110   6310
  6470   6450
  6500   1930   1970   3290   4330   7000   7040   7080   7120   7160
  6510   6560
  6600   6550
  6610   6590
  6630   0230   0850   1230   1380   1570   1780   2100   2320   2490   2560
         2850   3380   3570   3820   5940   6520
  6650   0820   1460   1670   1880   2200   2290
  6670   0760   1340   1650   1860   2180   2400
  6700   4700   5200   5310   5560   5650   5800
  6770   6820
  6790   6770
  6810   6870
  6840   6780
  6890   6840
  6950   6720   6930
  6980   1490   1700   2230
  7030   7010
  7070   7050
  7110   7090
  7150   7130
  7190   7170
  A$     0240   0260   0270   0280   0870   0880   0910   0920   0950   0960
         0990   1000   1030   1040   1070   1100   1130   1140   1170   1180
         1240   1270   1280   1290   1580   1610   1620   1630   1790   1820
         1830   1840   2110   2140   2150   2160   2330   2360   2370   2380
         3390   3420   3830   3860   3880
  C      3000   3130   3180   3250   3510   3980   4090   4200   4310   4420
```

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        STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                           PAGE 22
                      SYMBOL TABLE FOR ISCN10.AS

SYMBOL    REFERENCES
------   ---------------------------------------------------------------------
         4480
  C$     0090   2670   2950   2960
  C1     3010
  C1$    2860   2890   2920   2960   3030   3050
  D$     3550   3710   3750   3760
  E      6700   6810   6950
  E1     1940   1980   3320   4350   6500   6600   7010   7050   7090   7130
         7170
  F2$    0650   0690   0730   0790   1310
  F7$    0660   4520   5880   6130   6220   6330   6340
  FL#1   0470   0480   0490
  FL#2   0730   0740   0780   0790   0800   0840   1310   1320   2410   6650
         6670
  FL#6   6190   6210   6220   6230   6270   6290
  FL#7   4520   4570   4750   4940   4990   5220   5330   5440   5580   5630
         5680   5820   5860   6130   6250   6300   6340   6370   6420
  I      0600   0620   0640   1500   1510   1520   1710   1720   1730   2240
         2250   2260   2940   2960   2980   3010   3030   3050   3650   3660
         3680   4540   4560   5170   5180   5190   5230   5280   5290   5300
         5340   5530   5540   5550   5590   5770   5780   5790   5830   6240
         6280   6360   6400
  I$     0080   4650   4660   4710   4720   4730   4740   4750   4780   4790
         4800   4810   4820   4840   4850   4860   4890   4920   4930   4940
         4980   4990   5370   5380   5390   5400   5410   5430   5440   5620
         5630   5660   5670   5680   6250   6270   6370   6390
  I0$    2500   2530   2540   2542   3560   3790   6250   6370
  I1$    0080
  I2$    0080   4530   4550   4570
  I3$    0080   0150   4650   4780   5060   5370   5460   5700
  J      0610   0620   0630   0750   0770   0810   0830   1330   1350   1450
         1510   1660   1720   1870   1920   1950   1960   1990   2000   2030
         2040   2050   2190   2250   2950   2960   2970   3000   3660   3670
         5160   5190   5270   5300   5520   5550   5760   5790   6650   6670
         6990   7020   7030   7060   7070   7100   7110   7140   7150   7180
  J1     4870   4910   4920
  K      3160   3200   3230   3350   3490   3780
  L      2920   2930   2940   3050   3100
  L0     3070   3080   3090   3100
  L1$    0590   0740   0800   1120   1180   1320   3760
  M5     6100   6110   6120   6310
  N      2900   3030   3080   3110   3160   3230   3440   3450   3490   3890
         3900   3930   4040   4140   4280   4390   4450   4690   5190   5300
         5550   5640   5790   6720   6740   6750   6770   6790   6840   6850
         6890   6900
  N$     0090   4710   5210   5320   5570   5660   5810   6710   6740   6800
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    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                         PAGE 23
                       SYMBOL TABLE FOR ISCN10.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------
        6860  6920  6960
N1$     0090  6900  6910  6920
N2$     6950  6960
O$      5920  6010
O1      6010  6020  6100
O1$     5950  5980  5990  6000  6010
P       2910  3050  3090  3150  3220  3480  3940  3950  3960  3990
        4000  4010  4050  4060  4070  4100  4110  4150  4160  4170
        4180  4210  4220  4230  4240  4250  4290  4400  4460
P$      0500  0650  0670  0740  0800  1320
P2      4900  4910
P2$     0670  6460
Q$      0080  5060  5070  5080  5090  5100  5150  5180  5210  5220
        5260  5290  5320  5330  5460  5470  5480  5490  5500  5510
        5540  5570  5580  5700  5710  5720  5730  5740  5750  5780
        5810  5820
Q0$     1390  1420  1430  1440
Q1$     0070  0130  5180  5540  5780
Q2$     0070  0140  5290
Q[      0100  0620  1510  1720  1920  1950  1960  1990  2000  2030
        2040  2050  2070  2250  5190  5300  5550  5790  6650  6670
        6990  7020  7030  7060  7070  7100  7110  7140  7150  7180
R0$     0570  0740  0800  0940  1000  1320  4570  4720  4790  5080
        5380  5480  5720
R1$     0560  0740  0800  0860  0920  1320  4570
R3$     0580  0740  0800  1020  1100  1320  4810  5400
S$      0480  4570
S0      2660  3260  3270  3450
S1$     0090  0110  4740  4890
S2$     0090  0120  4840
U       2570  2600  2610  3730  3740  3750
U$      0090  2440  3760  3770  4920
U0      2650  3520  3530  3760  3770  3900
U1      3700  3710
U1$     3580  3630  3650  3660  3700
V       1950  1990  3300  3310  4340  6510  6570  7020  7060  7100
        7140  7180
V$      6530  6550  6570
V0$     0070  0160  3660
W       2430
W0      2640  3170  3180  3190  3240  3250  3270  3280  3300  3440
        3500  3510  3530  3540  3890  3970  3980  3990  4020  4080
        4090  4100  4110  4120  4190  4200  4210  4230  4260  4300
        4310  4320  4340  4410  4420  4430  4470  4480  4490  4600
W1      4580  4590  4600  4610  4670  4680  4690  4740  4830  4840
```

```
    STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                         PAGE 24
                       SYMBOL TABLE FOR ISCN10.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------
        4870  4890  4900  4930  4960  4970  5030  5040  5110  5130
        5250  5420  5640
W[      0100  3180  3250  3270  3300  3510  3530  3950  3960  3980
        3990  4000  4010  4060  4070  4090  4100  4110  4160  4170
        4180  4200  4210  4220  4230  4240  4250  4310  4340  4420
        4480  4610  4670  4680  4690  4740  4830  4840  4870  4890
        4900  4910  4930  4960  4970  5030  5040  5110  5130  5250
        5420  5640
```

TYPING GUIDE SHEET

SECTION 14

ISCN.11 - THE GENERAL PURPOSE REPORT GENERATOR

The ISCN.11 program is a utility program accessible from the ASCL (ISCN.00) through the 'R' command. The program facilitates the output of extant report files to a selected output device. It is also capable of generating a formatted report on the current contents of the system data files (i.e. ISCN.ID, ISCN.DF, and ISCN.TR). Finally the program is capable of outputting any Run File or Run Results File to a selected device, provided that the full name of the file is input by the user. Figure 16 shows the function and flow of the ISCN.11 program. This program will be extremely useful to the system manager for debugging SFC problems.

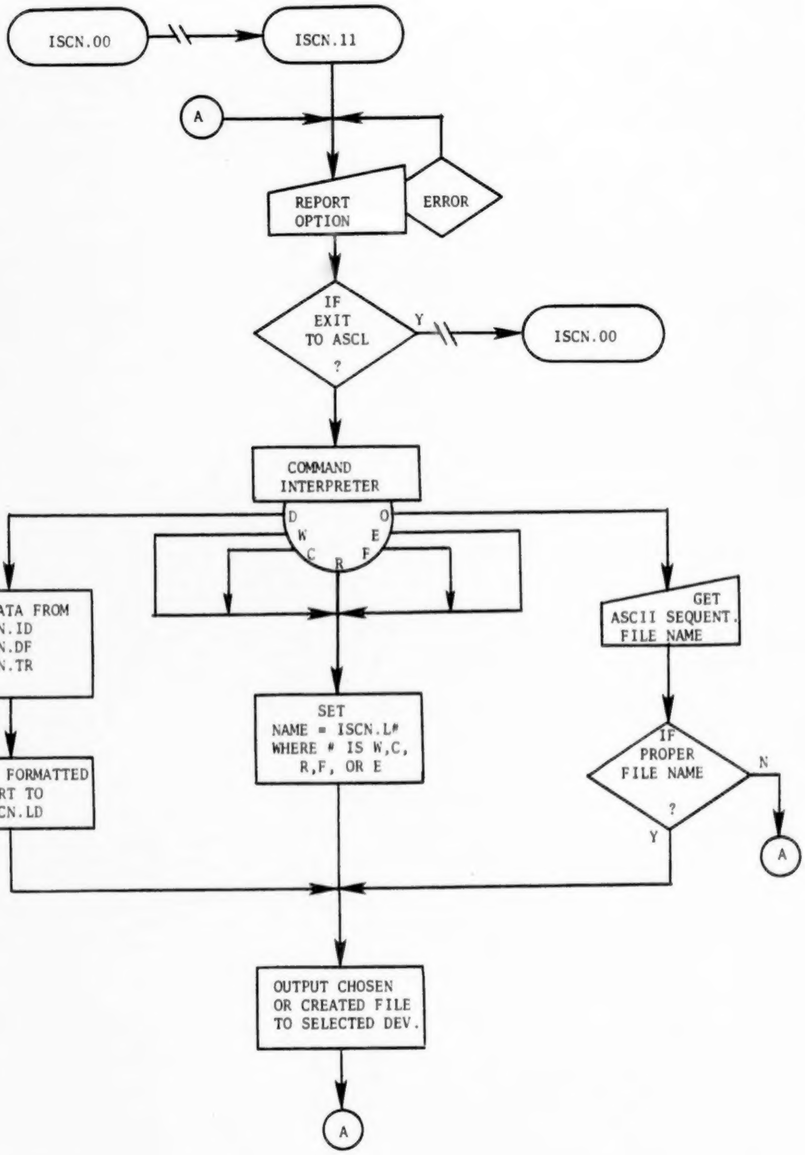
ISCN.00
ISCN.11
A
REPORT OPTION
ERROR
IF EXIT TO ASCL ?
Y
ISCN.00
COMMAND INTERPRETER
D
W
C
R
F
E
O
READ DATA FROM ISCN.ID ISCN.DF ISCN.TR
WRITE FORMATTED REPORT TO ISCN.LD
SET NAME = ISCN.L# WHERE # IS W,C, R,F, OR E
GET ASCII SEQUENT. FILE NAME
IF PROPER FILE NAME ?
N
Y
A
OUTPUT CHOSEN OR CREATED FILE TO SELECTED DEV.
A

Figure 16. Program ISCN.11 -- Report/data dumper.

TYPING GUIDE SHEET

TABLE 17. SYMBOL DEFINITIONS FOR ISCN.11

A	the report option flag
A$	the response to the report option prompt
A1	the output option flag
A1$	the response to the output option prompt
B0	the number of reagent blanks in the wheel pattern
D0$	the date code of the Run File
D1(	the data array for a sample
F0$	the name of the sample identifier file
F1$	the name of the sample data file
F2$	the name of the system transfer file
F3$	the name of the report list file
I	a counter
I$	the list-file record contents
I0$	the list-file record delimiter
I1$	the sample identifer string
M0	the computational mode flag
M1	the sequencing mode flag
M2	the data acquisition mode flag
M5	the output mode flag
N0	the number of peak points
N1	the number of baseline points
P$	the prefix for programs and data files
P0$	the source program (.00)
P1$	the resident program (.11)
P3$	the ASCL program name (.00)
R0	the number of Run File records
R0$	the PARMETH code for the Run File
R1$	the analyst's initials
R2$	the analyte name
R3$	the concentration units
R4$	the instrument name
S$	the instrument system name
S0	the number of standards in the wheel pattern
U0	the number of unknowns in the wheel pattern
U1$	the absorbance value format field
U2$	the concentration value format field
W0	the number of samples in the wheel pattern
W1	a wheel position counter
X0	the lowest absorbance value
X9	the highest absorbance value
Y0	the lowest (non-zero) concentration value
Y9	the highest concentration value
Z0	channel for SYNC reset (HGA/NOVA)

TABLE 17. (Contd.)

Z1	channel for NOVA ready-set
Z2	channel for sense reset
Z3$	check for peak array parameters
Z4	channel for CALL 7 without sense
Z5	channel for CALL 7 with sense
Z6	delay before data acquisition
Z7	interval between points
Z9	the injection counter

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  1
                  PROGRAM LISTING FOR ISCN11.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: ISCN.11 - OUTPUT REPORTS OR SYSTEM DATA        *
0040 REM *   BY: D.RYAN (UCCC), NOVEMBER 5, 1979                     *
0050 REM *   MOST RECENT REVISION: APRIL 19, 1980                    *
0060 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0070 PRINT
0080 PRINT "BEGIN REPORT / DATA DUMP SESSION."
0090 ON ESC THEN GOTO 0470
0100 ESC
0110 DIM D1[25],D2[25],Q[5,6],Q2[5]
0120 DIM R1$[4],R2$[2],R3$[8],R4$[16],A$[80],A1$[80]
0130 DIM R5$[72],R6$[72],R7$[72],R8$[72],R9$[72]
0140 DIM I1$[15],I2$[15],Q1$[35],F7$[13]
0150 DIM F0$[11],F1$[10],F2$[10],P$[10],R$[10]
0160 DIM D0$[20],I$[100]
0170 ON ERR THEN STOP
0180 OPEN FILE[6,3],"INST.NM"
0190 LREAD FILE[6],S$
0200 CLOSE FILE[6]
0210 LET P$="ISCN"
0220 ON ERR THEN STOP
0230 ON ESC THEN GOTO 0230
0240 ESC
0250 GOTO 0270
0260 PRINT "<7>";
0270 PRINT
0280 PRINT "REPORT/DATA OUTPUT OPTION: ([H]DWCRFE01) ";
0290 ON ERR THEN GOTO 1900
0300 INPUT "> ",A$;
0310 ON ERR THEN STOP
0320 PRINT
0330 LET F3$=""
0340 IF A$<>"H" THEN IF LEN(A$)<>0 THEN GOTO 0440
0350 PRINT "   D - DUMP CONTENTS OF DATA FILES .DF, .ID, AND .TR"
0360 PRINT "   W - OUTPUT WHEEL PATTERN"
0370 PRINT "   C - OUTPUT CALIBRATION REPORT"
0380 PRINT "   R - OUTPUT INTERIM REPORT"
0390 PRINT "   F - OUTPUT FINAL REPORT"
0400 PRINT "   E - OUTPUT RF TRANSLATOR ERROR LIST"
0410 PRINT "   0 - OUTPUT OTHER LIST FILES (I.E. .RF AND .RR FILES)"
0420 PRINT "   1 - EXIT TO ASCL(1)"

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                    PAGE  2
                  PROGRAM LISTING FOR ISCN11.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0430 GOTO 0230
0440 LET A=POS("DWCRFE01",A$[1,1],1)
0450 ON A THEN GOTO 0650, 1240, 1240, 1240, 1240, 1240, 0550, 0470
0460 GOTO 0260
0470 LET P3$=P$,".00"
0480 CLOSE
0490 ON ERR THEN GOTO 0520
0500 NOESC
0510 CHAIN P3$
0520 ON ERR THEN STOP
0530 ESC
0540 STOP
0550 PRINT
0560 GOTO 0580
0570 PRINT "<7>";
0580 PRINT "WHAT IS THE FILE NAME ? ";
0590 ON ERR THEN GOTO 1900
0600 INPUT "> ",F3$;
0610 ON ERR THEN STOP
0620 PRINT
0630 IF LEN(F3$)=0 THEN GOTO 0570
0640 GOTO 1250
0650 LET F0$=P$,".ID"
0660 LET F1$=P$,".DF"
0670 LET F2$=P$,".TR"
0680 ON ESC THEN GOTO 1210
0690 OPEN FILE[0,0],F0$,20
0700 OPEN FILE[1,0],F1$
0710 OPEN FILE[2,0],F2$
0720 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
0730 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
0740 READ FILE[2,3],Q2[1],Q2[2],Q2[3],Q2[4],Q2[5],Q0,Q1
0750 READ FILE[2,4],C$,W,R,K0,X0,X9,N5,U1$,U2$
0760 READ FILE[2,9],R1$,R2$,R3$,R4$
0770 READ FILE[2,15],M0,M1,R1,M2,M5
0780 READ FILE[2,16],Z0,Z1,Z2,Z3,Z5,Z6
0790 READ FILE[2,17],Z7,Z8,Z9,N0,N1,N2
0800 READ FILE[2,18],Z1$,Z2$,Z3$,Z4$,Z5$
0810 READ FILE[2,19],T,T1,T2,T4,U1,Z4,M3
0820 LET F3$=P$,".LD"
0830 OPEN FILE[3,1],F3$
0840 PRINT FILE[3], TAB(5);"SYSTEM: ";S$; TAB(40);"ANALYST: ";R1$

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
 0850 PRINT FILE[3], TAB(5);"ANALYTE: ";R2$; TAB(40);"PARMETH: ";R0$
 0860 PRINT FILE[3], TAB(5);"RUN FILE NAME: ";F7$; TAB(40);"RF CREATED:
*       ";D0$
 0870 PRINT FILE[3], TAB(5);"INSTRUMENT: ";R4$; TAB(40);"UNITS: ";R3$
 0880 PRINT FILE[3], TAB(5);"SEQUENCING: ";S1$[M1*15+1,(M1+1)*15]; TAB(
*     40);"DATA ACCESS: ";S2$[M2*9+1,(M2+1)*9]
 0890 PRINT FILE[3], TAB(5);"COMPUTATION: ";S0$[M0*15+1,(M0+1)*15]; TAB
*     (40);"OUTPUT: ";S5$[M5*15+1,(M5+1)*15]
 0900 PRINT FILE[3], TAB(5);"RESIDENT PGM: ";P1$; TAB(40);"SOURCE PGM:
*     ";P0$
 0910 PRINT FILE[3], TAB(5);"HIGH STD: ";Y9; TAB(40);"HIGH ABS: ";X9
 0920 PRINT FILE[3], TAB(5);"LOW STD: ";Y0; TAB(40);"LOW ABS: ";X0
 0930 PRINT FILE[3], TAB(5);"STD FIELD: ";U2$; TAB(40);"ABS FIELD: ";U1
*     $
 0940 IF LEN(Z3$)=0 THEN GOTO 1010
 0950 PRINT FILE[3]
 0960 PRINT FILE[3], TAB(5);"SYNC RESET: ";Z0; TAB(40);"SET NOVA-READY:
*      ";Z1
 0970 PRINT FILE[3], TAB(5);"SENSE RESET: ";Z2; TAB(40);"CALL 7 W/O SEN
*     SE: ";Z4
 0980 PRINT FILE[3], TAB(5);"CALL 7 W/ SENSE: ";Z5; TAB(40);"DELAY (*1/
*     60): ";Z6
 0990 PRINT FILE[3], TAB(5);"INTERVAL (*1/60): ";Z7; TAB(40);"NO. PEAKS
*     : ";Z9
 1000 PRINT FILE[3], TAB(5);"BASELINE PTS: ";N1; TAB(40);"PEAKS PTS: ";
*     N0
 1010 PRINT FILE[3]
 1020 PRINT FILE[3], TAB(5);"SAMPLES: ";W0; TAB(40);"RUN FILE RECORDS:
*     ";R0
 1030 PRINT FILE[3], TAB(5);"CAL STDS: ";S0; TAB(40);"UNKNOWNS: ";U0
 1040 PRINT FILE[3], TAB(5);"CHECK STDS: ";Q2[5]; TAB(40);"INST BLANKS:
*      ";B0
 1050 PRINT FILE[3], TAB(5);"LAB SPIKES: ";Q2[1]; TAB(40);"REAGENT BLAN
*     KS: ";Q2[2]
 1060 PRINT FILE[3], TAB(5);"DUPLICATES: ";Q2[3]; TAB(40);"CNTRL STDS:
*     ";Q2[4]
 1070 PRINT FILE[3]
 1080 PRINT FILE[3]," WHEEL   /    SAMPLE    /  REC    QC    SAMP
*       CONCENTRATIONS"
 1090 PRINT FILE[3],"  POS    /  IDENTIFIER  /  NO.   PNTR   TYPE     M
*     ASSES AND VOLUMES"
 1100 PRINT FILE[3]

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

```
 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
 1110 FOR W1=1 TO W0
 1120   MAT READ FILE[1,W1],D1
 1130   READ FILE[0,W1],I1$
 1140   PRINT FILE[3],USING "  ###     ",W1;
 1150   PRINT FILE[3],I1$[1,14];
 1160   PRINT FILE[3],USING "    ###  ---#     ##  -#.###^^^^  -#.###^^
*     ^^",D1[1],D1[2],D1[3],D1[4],D1[5]
 1170 NEXT W1
 1180 NOESC
 1190 CLOSE
 1200 GOTO 1250
 1210 NOESC
 1220 CLOSE
 1230 GOTO 0230
 1240 LET F3$=P$,".L",A$[1,1]
 1250 ON ERR THEN GOTO 1270
 1260 RENAME F3$,F3$
 1270 ON ERR THEN STOP
 1280 IF SYS(7)=-11 THEN GOTO 1330
 1290 IF SYS(7)=-9 THEN GOTO 1330
 1300 PRINT
 1310 PRINT "<7>INVALID FILE NAME!<7>"
 1320 GOTO 0230
 1330 ON ESC THEN GOTO 1870
 1340 ESC
 1350 IF LEN(A$)=1 THEN GOTO 1400
 1360 LET A1$=A$[2]
 1370 GOTO 1460
 1380 GOTO 1400
 1390 PRINT "<7>";
 1400 PRINT
 1410 PRINT "OUTPUT OPTIONS: ([H]TLBN) ";
 1420 ON ERR THEN GOTO 1900
 1430 INPUT "> ",A1$;
 1440 ON ERR THEN GOTO 1870
 1450 PRINT
 1460 IF LEN(A1$)<>0 THEN IF A1$<>"H" THEN GOTO 1520
 1470 PRINT "    T - TERMINAL OUTPUT ONLY"
 1480 PRINT "    L - LINEPRINTER OUTPUT ONLY"
 1490 PRINT "    B - TERMINAL AND LINEPRINTER OUTPUT"
 1500 PRINT "    N - NO REPORT GENERATED"
 1510 GOTO 1400

 1234567891123456789212345678931234567894123456789512345678961234567897
          0         0         0         0         0         0         0
```

```
   STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                PAGE  5
                   PROGRAM LISTING FOR ISCN11.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1520 LET A1=POS("TLBN",A1$[1,1],1)
1530 IF A1=0 THEN GOTO 1390
1540 LET A1=A1-1
1550 IF A1=3 THEN GOTO 1860
1560 IF A1=0 THEN GOTO 1750
1570 OPEN FILE[3,3],F3$
1580 GOTO 1620
1590 PRINT "X";
1600 IF SYS(7)<>-48 THEN STOP
1610 DELAY =2.3
1620 OPEN FILE[6,1],"$LPT"
1630 PRINT FILE[6]
1640 PRINT FILE[6],"FILENAME ";F3$;"   ";SYS(11);":";SYS(12);"   ";SYS
*     (2);"/";SYS(1);"/";SYS(3)
1650 PRINT FILE[6]
1660 FOR I=1 TO 10000
1670   LREAD FILE[3],I$,I0$
1680    IF EOF(3)=1 THEN GOTO 1720
1690   LET I$=I$,I0$
1700    PRINT FILE[6],I$;
1710 NEXT I
1720 CLOSE FILE[6]
1730 CLOSE FILE[3]
1740 IF A1=1 THEN GOTO 1860
1750 OPEN FILE[3,3],F3$
1760 PRINT
1770 PRINT "FILENAME ";F3$;"   ";SYS(11);":";SYS(12);"   ";SYS(2);"/";
*     SYS(1);"/";SYS(3)
1780 PRINT
1790 FOR I=1 TO 10000
1800   LREAD FILE[3],I$,I0$
1810    IF EOF(3)=1 THEN GOTO 1850
1820    IF LEN(I$)>72 THEN LET I$=I$[1,72]
1830    PRINT I$;I0$;
1840 NEXT I
1850 CLOSE FILE[3]
1860 GOTO 0230
1870 NOESC
1880 CLOSE
1890 GOTO 0230
1900 PRINT "<7> > ";
1910 RETRY

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                PAGE  7
                   SYMBOL TABLE FOR ISCN11.AS

SYMBOL    REFERENCES
------  --------------------------------------------------------------
 0230   0230  0430  1230  1320  1860  1890
 0260   0460
 0270   0250
 0440   0340
 0470   0090  0450
 0520   0490
 0550   0450
 0570   0630
 0580   0560
 0650   0450
 1010   0940
 1210   0680
 1240   0450
 1250   0640  1200
 1270   1250
 1330   1280  1290
 1390   1530
 1400   1350  1380  1510
 1460   1370
 1520   1460
 1620   1580
 1720   1680
 1750   1560
 1850   1810
 1860   1550  1740
 1870   1330  1440
 1900   0290  0590  1420
 A      0440  0450
 A$     0120  0300  0340  0440  1240  1350  1360
 A1     1520  1530  1540  1550  1560  1740
 A1$    0120  1360  1430  1460  1520
 B0     0730  1040
 C$     0750
 D0$    0160  0720  0860
 D1     1120
 D1[    0110  1160
 D2[    0110
 F0$    0150  0650  0690
 F1$    0150  0660  0700
 F2$    0150  0670  0710
 F3$    0330  0600  0630  0820  0830  1240  1260  1570  1640  1750
        1770
 F7$    0140  0720  0860
 FL#0   0690  1130
 FL#1   0700  1120
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  8
                    SYMBOL TABLE FOR ISCN11.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------
 FL#2   0710  0720  0730  0740  0750  0760  0770  0780  0790  0800
        0810
 FL#3   0830  0840  0850  0860  0870  0880  0890  0900  0910  0920
        0930  0950  0960  0970  0980  0990  1000  1010  1020  1030
        1040  1050  1060  1070  1080  1090  1100  1140  1150  1160
        1570  1670  1730  1750  1800  1850
 FL#6   0180  0190  0200  1620  1630  1640  1650  1700  1720
 I      1660  1710  1790  1840
 I$     0160  1670  1690  1700  1800  1820  1830
 I0$    1670  1690  1800  1830
 I1$    0140  1130  1150
 I2$    0140
 K0     0750
 M0     0770  0890
 M1     0770  0880
 M2     0770  0880
 M3     0810
 M5     0770  0890
 N0     0790  1000
 N1     0790  1000
 N2     0790
 N5     0750
 P$     0150  0210  0470  0650  0660  0670  0720  0820  1240
 P0$    0720  0900
 P1$    0720  0900
 P2$    0720
 P3$    0470  0510
 Q0     0740
 Q1     0740
 Q1$    0140
 Q2[    0110  0740  1040  1050  1060
 Q[     0110
 R      0750
 R$     0150
 R0     0730  1020
 R0$    0720  0850
 R1     0770
 R1$    0120  0760  0840
 R2$    0120  0760  0850
 R3$    0120  0760  0870
 R4$    0120  0760  0870
 R5$    0130
 R6$    0130
 R7$    0130
 R8$    0130
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                     PAGE  9
                    SYMBOL TABLE FOR ISCN11.AS

SYMBOL    REFERENCES
------  ---------------  -------------------------------------------
 R9$    0130
 S$     0190  0840
 S0     0730  1030
 S0$    0890
 S1$    0880
 S2$    0880
 S5$    0890
 S9     0730
 T      0810
 T0     0730
 T1     0810
 T2     0810
 T4     0810
 U0     0730  1030
 U1     0810
 U1$    0750  0930
 U2$    0750  0930
 W      0750
 W0     0730  1020  1110
 W1     1110  1120  1130  1140  1170
 X0     0750  0920
 X9     0750  0910
 Y0     0730  0920
 Y9     0730  0910
 Z0     0780  0960
 Z1     0780  0960
 Z1$    0800
 Z2     0780  0970
 Z2$    0800
 Z3     0780
 Z3$    0800  0940
 Z4     0810  0970
 Z4$    0800
 Z5     0780  0980
 Z5$    0800
 Z6     0780  0980
 Z7     0790  0990
 Z8     0790
 Z9     0790  0990
```

SECTION 15

ISCN.12 - THE EDITOR

The ISCN.12 program provides the sample editing capabilities for the system. It is accessible from the IRCL (ISCN.04) through the 'E#' command and is capable of facilitating the deletion of replicate data ('S(POS)'), the erasure or purge of absorbance data ('P'), and the modification of dilution volumes maintained for a sample ('D(POS)'). The command string may be cascaded in the IRCL (i.e. 'ES15') and carried to the ISCN.12 program in the transfer file (ISCN.TR). If only the 'E' command is invoked from the IRCL, the editor program will supply all the prompts necessary to perform editing. The completion of any edit function will return control to the edit option line. This requires an additional option to facilitate the transfer of control to the IRCL. Figure 17 shows the function and flow of the ISCN.12 program.

The purge option ('P') is the simplest of the editor modules. The default for the first and last purgeable samples are the first and last positions in the sample wheel. These defaults are upgraded each time the purge module is exited. They are not maintained if the editor itself is exited. Once the positions are verified, each affected sample data record (ISCN.DF) is read and array positions D1(6) through D1(13) are zeroed. This wipes out the average absorbance, the number of replicates, and each individual replicate maintained on the sample. No other data is changed. Note that a counter (K) is incremented if a calibration standard is affected in a purge. If calibration has already occurred and standard's data is tampered with, then a message will be generated warning the user that recalibration may be necessary.

Both the selective deletion ('S(POS)') and the dilution volume modification ('D(POS)') options utilize the same code to show the current data sorted for the sample in question. This code is nearly identical to that in the measurement module of the ISCN.04 program and the interim report generator program (ISCN.06). After outputting the same description line and the current sample data, however, the program branches to handle each option separately.

The selective deletion of a replicate absorbance is notable since the module always compacts the remaining absorbance values toward the left in the allowable array positions D1(8) through D1(13). In this way the current number of replicates maintained on a sample (D1(7)) will always specify the number of loaded positions to the right of D1(7). Once again, the K-counter is used to record the deletion of calibration standard absorbance data. If

K is greater than zero and calibration has occurred, a cautionary message is issued recommending recalibration.

The dilution modification module utilizes the stored volumes for a sample as the default volumes unless the sample has not been previously diluted. The default sample and dilution volumes in this case would both be zero. Two points are worth mentioning about this module. The first is that all volumes are stored as liters even though they are input in mililiters. Secondly, if an unknown is diluted and that unknown has a secondary QC member following it, the dilution volumes for the secondary member will also be modified. Note that in changing the dilution volumes for a sample, the current absorbance measurements for the sample and any related QC will be purged.

The edit program can only be exited from the option line. Usually if any ESCape is pressed during the execution of a program function, control will shift to the option line. However, for brief periods, the ESCape is dissabled to protect sample data.

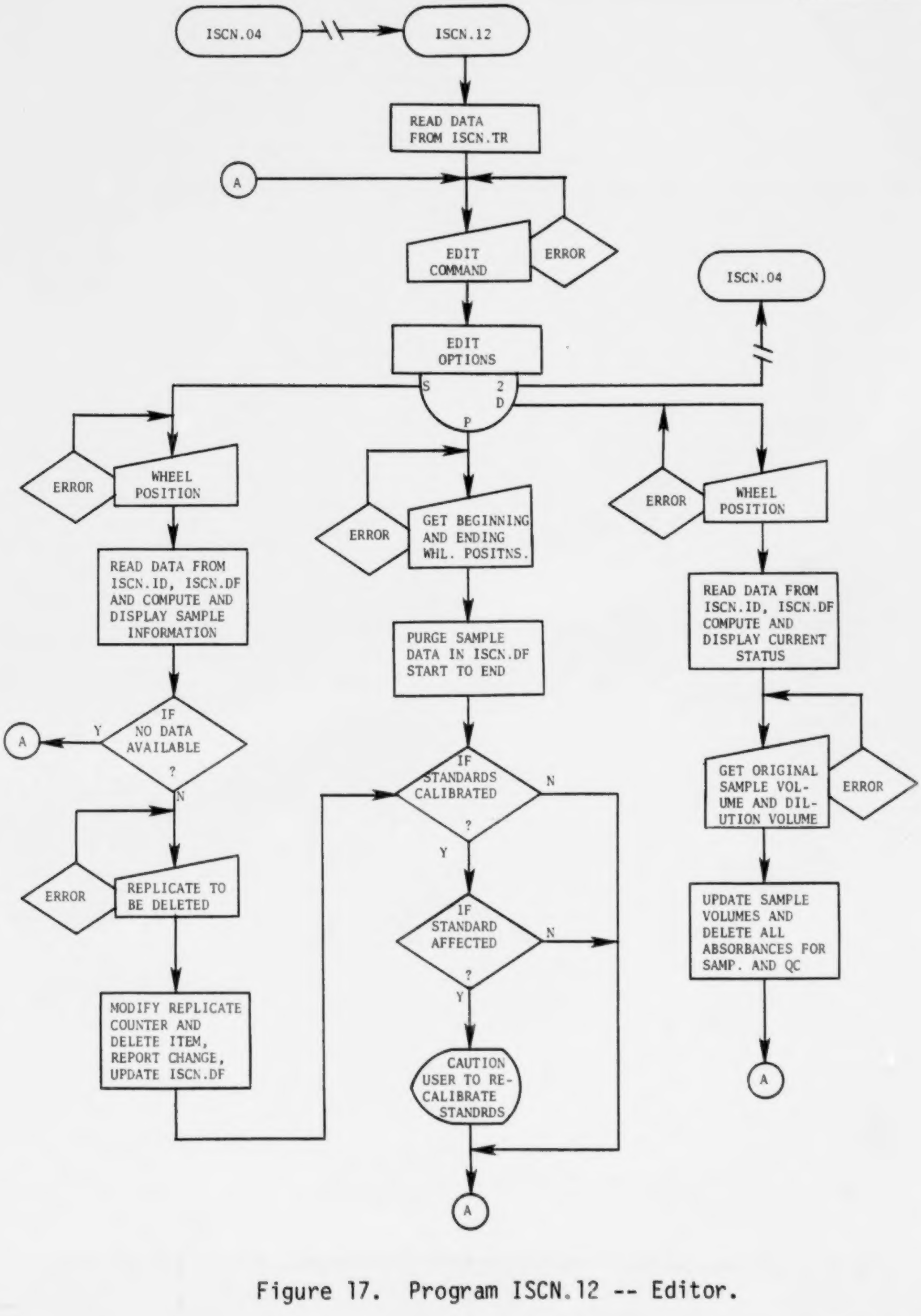
ISCN.04
ISCN.12
READ DATA FROM ISCN.TR
A
EDIT COMMAND
ERROR
ISCN.04
EDIT OPTIONS
S
2
D
P
ERROR
WHEEL POSITION
READ DATA FROM ISCN.ID, ISCN.DF AND COMPUTE AND DISPLAY SAMPLE INFORMATION
A
Y
IF NO DATA AVAILABLE ?
N
ERROR
REPLICATE TO BE DELETED
MODIFY REPLICATE COUNTER AND DELETE ITEM, REPORT CHANGE, UPDATE ISCN.DF
ERROR
GET BEGINNING AND ENDING WHL. POSITNS.
PURGE SAMPLE DATA IN ISCN.DF START TO END
IF STANDARDS CALIBRATED ?
N
Y
IF STANDARD AFFECTED ?
N
Y
CAUTION USER TO RE-CALIBRATE STANDRDS
A
ERROR
WHEEL POSITION
READ DATA FROM ISCN.ID, ISCN.DF COMPUTE AND DISPLAY CURRENT STATUS
GET ORIGINAL SAMPLE VOLUME AND DILUTION VOLUME
ERROR
UPDATE SAMPLE VOLUMES AND DELETE ALL ABSORBANCES FOR SAMP. AND QC
A

Figure 17. Program ISCN.12 -- Editor.

TABLE 18. SYMBOL DEFINITIONS FOR ISCN.12

A$	a response to a prompt
A1$	a default string
A2$	a response to a prompt
A7$	a volume default string
A8$	a volume default string
B$	a positional string
C$	the IRCL command string
C1	the calculated concentration of a sample
C7	an interpolation parameter - the lower concentration
C8	an interpolation parameter - the higher concentration
D	the dilution factor
D0$	the date code for the Run File
D1(	the data array for a sample
D2(	the data array for a previous (primary) QC member
F7$	the name of the Run File
G2	the computed concentration of a sample
G3	the reportable concentration of a sample
G4	the concentration of the primary QC member
G5	the reported spike value (LSA)
I	a counter
I1$	the current sample identifier string
I2$	the identifier string of a previous QC member
J	a counter
J0	a computational mode variable
J1	the replicate to be deleted
J2	the replicate deletion shift variable
K	the standard-edit counter
K0	the calibration flag
M	the mass of added spike
M0	the computational mode flag
M0$	the computational mode descriptor string
N	the number of standards in the calibration set
P$	the prefix for programs and data files
P0$	the name of the source program (.04)
P1$	the name of the current program (.12)
P2$	the name of the destination program (.04)
P(	the polynomial coefficient array
Q	the QC assessment value
R0$	the PARMETH code of the Run File
R7	an interpolation parameter - the lower absorbance
R8	an interpolation parameter - the higher absorbance
R9	the concentration difference between duplicates
S	the absorbance of a sample

TABLE 18. (Contd.)

S0$	the sample type identifier super-string
V6	a replicate averaging variable
V7	the original sample volume
V7$	the input string for original sample volume
V8	the dilution volume
V8$	the input string for dilution volume
V9	the displayed dilution factor
W0	the number of samples in the wheel pattern
W1	a wheel position counter
W2	the wheel position of a primary QC member
W3	the first wheel position of a purge
W4	the last wheel position of a purge
X	the mean duplicate value

PROGRAM LISTING FOR ISCN12.AS

```
 12345678911234567892123456789312345678941234567895123456789612345678970
          0         0         0         0         0         0         0
 0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
 0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
 0030 REM *   PROGRAM: ISCN.12 - GENERAL EDIT MODULE (SPD)            *
 0040 REM *   BY D.RYAN (UCCC), APRIL 15, 1980                        *
 0050 REM *   MOST RECENT REVISION: APRIL 15, 1980                    *
 0060 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
 0070 DIM R1$[4],R2$[2],R3$[8],R4$[16]
 0080 DIM S0$[150],M0$[20],I1$[15],I2$[15],S1$[80]
 0090 DIM D1[25],D2[25],P[6]
 0100 DIM D0$[20],Z4$[20],Z5$[20]
 0110 LET M0$="FZERLINRQUADCUBCINTR"
 0120 LET C0$="HMCREFSUPX"
 0130 LET S0$="TIMING SET STD  INSTR CAL STD UNKNOWN SAMPLE    SPIKE  0
*     F    "
 0140 LET S0$=S0$,"   CHECK  OF    DUPLICATE  OF  LAB CNTRL STD "
 0150 LET S0$=S0$," REAGENT BLANK  SURROGATE SPK   INSTR BLANK  "
 0160 LET A7$="0"
 0170 LET A8$="0"
 0180 LET C$=""
 0190 READ FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
 0200 LET P0$=P$,".04"
 0210 LET P1$=P$,".12"
 0220 LET P2$=P$,".04"
 0230 WRITE FILE[2,1],P$,F7$,P0$,P1$,P2$,R0$,D0$
 0240 READ FILE[2,2],R0,W0,S0,U0,B0,Y0,Y9,T0,S9
 0250 READ FILE[2,4],C$,W,R,K0,X0,X9,N1,U1$,U2$
 0260 READ FILE[2,15],M0,M1,R1,M2,M5,E5
 0270 LET W3=1
 0280 LET W4=W0
 0290 LET A7$="0"
 0300 LET A8$="0"
 0310 LET K=0
 0320 ON ESC THEN GOTO 0370
 0330 ESC
 0340 IF LEN(C$)<=1 THEN GOTO 0370
 0350 LET A$=C$[2]
 0360 GOTO 0490
 0370 PRINT
 0380 PRINT "SAMPLE EDIT OPTION: ([H]SPD2) ";
 0390 ON ERR THEN GOTO 3470
 0400 INPUT "> ",A$;
 0410 ON ERR THEN STOP

 12345678911234567892123456789312345678941234567895123456789612345678970
          0         0         0         0         0         0         0
```

PROGRAM LISTING FOR ISCN12.AS

```
12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
0420 PRINT
0430 IF LEN(A$)<>0 THEN IF A$<>"H" THEN GOTO 0490
0440 PRINT "   S[POS]- SELECTIVE DELETION OF REPLICATE ABSORBANCE"
0450 PRINT "   P     - PURGE DATA FOR SPECIFIED SAMPLES"
0460 PRINT "   D[POS]- CHANGE DILUTION VOLUMES"
0470 PRINT "   2     - RETURN TO IRCL(2)"
0480 GOTO 0370
0490 ON POS("SPD2",A$[1,1],1) THEN GOTO 0520, 0700, 0520, 1130
0500 PRINT "<7>";
0510 GOTO 0370
0520 IF LEN(A$)<=1 THEN GOTO 0550
0530 LET B$=A$[2]
0540 GOTO 0610
0550 PRINT
0560 PRINT "SAMPLE POSITION ";
0570 ON ERR THEN GOTO 3470
0580 INPUT "> ",B$;
0590 ON ERR THEN STOP
0600 PRINT
0610 IF LEN(B$)>0 THEN GOTO 0640
0620 PRINT "<7>";
0630 GOTO 0550
0640 FOR I=1 TO LEN(B$)
0650   IF POS("0123456789",B$[I,I],1)=0 THEN GOTO 0620
0660 NEXT I
0670 LET W1=VAL(B$)
0680 IF INT(W1)=W1 THEN IF W1>=1 THEN IF W1<=W0 THEN GOTO 1260
0690 GOTO 0500
0700 LET A2$=""
0710 LET A1$=STR$(W3)
0720 GOTO 0740
0730 PRINT "<7>";
0740 PRINT
0750 PRINT "FIRST POSITION   [";A1$;"] ";
0760 ON ERR THEN GOTO 3470
0770 INPUT " > ",A2$;
0780 ON ERR THEN GOTO 0730
0790 PRINT
0800 IF LEN(A2$)=0 THEN LET A2$=A1$
0810 LET W3=VAL(A2$)
0820 ON ERR THEN STOP
0830 LET A1$=STR$(W4)

12345678911234567892123456789312345678941234567895123456789612345678970
         0         0         0         0         0         0         0
```

```
  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                  PAGE  3
                       PROGRAM LISTING FOR ISCN12.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0

0840 GOTO 0860
0850 PRINT "<7>";
0860 PRINT "LAST POSITION    [";A1$;"] ";
0870 ON ERR THEN GOTO 3470
0880 INPUT " > ",A2$;
0890 ON ERR THEN GOTO 0850
0900 PRINT
0910 IF LEN(A2$)=0 THEN LET A2$=A1$
0920 LET W4=VAL(A2$)
0930 ON ERR THEN STOP
0940 IF W3>=1 THEN IF W4<=W0 THEN IF W3<=W4 THEN GOTO 1000
0950 PRINT
0960 PRINT "<7>IMPROPER RANGE!<7>"
0970 LET W3=1
0980 LET W4=W0
0990 GOTO 0710
1000 NOESC
1010 FOR W1=W3 TO W4
1020   GOSUB 3510
1030   IF D1[3]=1 THEN LET K=K+1
1040   FOR J=6 TO 13
1050     LET D1[J]=0
1060   NEXT J
1070   GOSUB 3570
1080 NEXT W1
1090 ESC
1100 IF W4<W0 THEN LET W3=W4+1
1110 LET W4=W0
1120 GOTO 0370
1130 LET P2$=P$,".04"
1140 IF K=0 THEN GOTO 1190
1150 IF K0=0 THEN GOTO 1190
1160 PRINT "<7>"
1170 PRINT "YOU HAVE MODIFIED STANDARD ABS DATA."
1180 PRINT "PLEASE RECALIBRATE AS SOON AS POSSIBLE"
1190 NOESC
1200 ON ERR THEN GOTO 1230
1210 NOESC
1220 CHAIN P2$
1230 ON ERR THEN STOP
1240 ESC
1250 STOP

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
  STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                  PAGE  4
                       PROGRAM LISTING FOR ISCN12.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1260 GOSUB 3510
1270 PRINT
1280 IF A$[1,1]="D" THEN GOTO 1310
1290 PRINT USING "EDIT POS ### ",W1;
1300 GOTO 1360
1310 IF D1[3]=2 THEN GOTO 1350
1320 PRINT "<7>"
1330 PRINT "ONLY UNKNOWNS MAY BE DILUTED!"
1340 GOTO 0500
1350 PRINT USING "DILT POS ### ",W1;
1360 PRINT "/";I1$;"/";S0$[D1[3]*15+1,(D1[3]+1)*15];
1370 LET W2=D1[2]
1380 IF W2<W1 THEN IF W2>=1 THEN GOTO 1440
1390 IF W2<>0 THEN GOTO 1420
1400 PRINT
1410 GOTO 1490
1420 IF W2=-1 THEN GOTO 1480
1430 GOTO 1490
1440 GOSUB 3540
1450 PRINT S0$[D2[3]*15+1,(D2[3]+1)*15];
1460 PRINT USING " IN POS ###",W2
1470 GOTO 1490
1480 PRINT " (HAS QC)"
1490 PRINT "  AVE.ABS= ";D1[6];
1500 PRINT "  NO.REPS = ";D1[7]
1510 IF D1[7]=0 THEN GOTO 2380
1520 PRINT  TAB(1);
1530 FOR I=1 TO D1[7]
1540   PRINT I;">";D1[I+7];"  ";
1550 NEXT I
1560 PRINT
1570 LET D=1
1580 ON D1[3] THEN GOTO 2380, 1620, 1600, 2300, 1640, 1650, 1650
1590 GOTO 2380
1600 LET D=(D2[4]+D2[5]+D1[4])/(D2[4]+D1[4])
1610 GOTO 1650
1620 LET D=(D1[4]+D1[5])/D1[4]
1630 GOTO 1650
1640 LET D=(D2[4]+D2[5])/D2[4]
1650 IF K0=1 THEN GOTO 1670
1660 GOTO 2380
1670 LET S=D1[6]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE  5
                         PROGRAM LISTING FOR ISCN12.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
1680 GOSUB 3630
1690 LET G2=C1
1700 PRINT "  CURRENT CONC      = ";G2;"(";M0$[(J0-1)*4+1,J0*4];")"
1710 IF D=1 THEN GOTO 1730
1720 PRINT "  DIL FACTOR        = ";D
1730 LET G3=G2*D
1740 PRINT "     RPT CONC (";I1$[12,14];")    = ";G3
1750 ON D1[3] THEN GOTO 2380, 2380, 1770, 2300, 2080, 2230, 2280
1760 GOTO 2380
1770 IF D2[7]=0 THEN GOTO 2380
1780 LET S=D2[6]
1790 GOSUB 3630
1800 LET G4=C1*(D2[4]+D2[5])/D2[4]
1810 LET M=D1[4]*D1[5]
1820 IF D1[4]=0 THEN LET M=D1[5]
1830 LET G5=(M*D2[4]-C1*D1[4]*(D2[4]+D2[5]))/(D2[4]*(D2[4]+D1[4]))
1840 PRINT "     RPT CONC (";I2$[12,14];")    = ";G4
1850 PRINT "     RPT SPIKE (LSA)  = ";G5
1860 IF G5=0 THEN GOTO 2070
1870 LET Q=(G3-G4)*100/G5
1880 PRINT "     % RECOVERY        = ";Q;"%"
1890 PRINT "     QC MESSAGE        > ";
1900 FOR J=1 TO 5
1910   IF D1[3]<>3 THEN GOTO 1940
1920   IF Q>D2[13+J] THEN GOTO 1970
1930   GOTO 1950
1940   IF Q>D1[13+J] THEN GOTO 1970
1950 NEXT J
1960 LET J=6
1970 ON J THEN GOTO 1980, 2000, 2020, 2020, 2040, 2060
1980 PRINT "<7><7><7>OUT HIGH!<7><7><7>"
1990 GOTO 2380
2000 PRINT "<7><7>WARN HIGH!<7><7>"
2010 GOTO 2380
2020 PRINT "QC OK"
2030 GOTO 2380
2040 PRINT "<7><7>WARN LOW!<7><7>"
2050 GOTO 2380
2060 PRINT "<7><7><7>OUT LOW!<7><7><7>"
2070 GOTO 2380
2080 IF D2[7]=0 THEN GOTO 2380
2090 LET S=D2[6]

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE  6
                         PROGRAM LISTING FOR ISCN12.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
2100 GOSUB 3630
2110 LET G4=C1*D
2120 PRINT "     RPT CONC (";I2$[12,14];")    = ";G4
2130 LET X=(G3+G4)/2
2140 PRINT "     XBAR (AVE)        = ";X
2150 LET R9=ABS(G3-G4)
2160 PRINT "     R (CRIT DIFF)     = ";R9
2170 PRINT "     QC MESSAGE        > ";
2180 IF R9>D2[22]+X*(D2[21]+X*(D2[20]+X*D2[19])) THEN GOTO 2210
2190 PRINT "QC OK!"
2200 GOTO 2220
2210 PRINT "<7><7><7>OUT!<7><7><7>"
2220 GOTO 2380
2230 PRINT "     THEOR CONC (LCT) = ";D1[5]
2240 IF D1[5]=0 THEN GOTO 2380
2250 LET Q=100*G3/D1[5]
2260 PRINT "     % RECOVERY        = ";Q;"%"
2270 GOTO 1890
2280 LET Q=G3
2290 GOTO 1890
2300 IF D2[7]=0 THEN GOTO 2380
2310 LET X=D1[6]
2320 PRINT "     ABS OF CHK STD    = ";X
2330 PRINT "     ABS OF CAL STD    = ";D2[6]
2340 IF D2[6]=0 THEN GOTO 2380
2350 LET Q=100*X/D2[6]
2360 PRINT "     % RECOVERY        = ";Q;"%"
2370 GOTO 1890
2380 IF A$[1,1]<>"S" THEN GOTO 2750
2390 IF D1[7]>0 THEN GOTO 2410
2400 GOTO 0370
2410 PRINT
2420 PRINT "DELETE REPLICATE ABS NUMBER ([0] TO EXIT) ";
2430 LET A1$="0"
2440 ON ERR THEN GOTO 3470
2450 INPUT "> ",A2$;
2460 ON ERR THEN STOP
2470 PRINT
2480 IF LEN(A2$)=0 THEN LET A2$=A1$
2490 IF LEN(A2$)=1 THEN IF A2$>="0" THEN IF A2$<="9" THEN GOTO 2520
2500 PRINT "<7>";
2510 GOTO 2410

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
        0          0          0          0          0          0          0
2520 LET J1=VAL(A2$)
2530 IF J1>=0 THEN IF J1<=D1[7] THEN GOTO 2550
2540 GOTO 2500
2550 IF J1=0 THEN GOTO 0370
2560 NOESC
2570 LET V6=0
2580 FOR J=1 TO D1[7]
2590   IF J=J1 THEN GOTO 2640
2600   LET V6=V6+D1[J+7]
2610   LET J2=J
2620   IF J>J1 THEN LET J2=J-1
2630   LET D1[J2+7]=D1[J+7]
2640 NEXT J
2650 LET D1[D1[7]+7]=0
2660 LET D1[7]=D1[7]-1
2670 IF D1[7]>0 THEN GOTO 2700
2680 LET D1[6]=0
2690 GOTO 2710
2700 LET D1[6]=V6/D1[7]
2710 IF D1[3]=1 THEN LET K=K+1
2720 GOSUB 3570
2730 ESC
2740 GOTO 1490
2750 IF D1[4]<>1 THEN LET A7$=STR$(D1[4]*1000)
2760 IF D1[5]<>0 THEN LET A8$=STR$(D1[5]*1000)
2770 GOTO 2790
2780 PRINT "<7>";
2790 PRINT
2800 PRINT "MODIFY DILUTION VOLUMES ? ([N] OR Y) ";
2810 ON ERR THEN GOTO 3470
2820 INPUT "> ",A$;
2830 ON ERR THEN STOP
2840 PRINT
2850 IF LEN(A$)<>0 THEN IF A$<>"N" THEN GOTO 2870
2860 GOTO 0370
2870 IF A$<>"Y" THEN GOTO 2780
2880 GOTO 2910
2890 ON ERR THEN STOP
2900 PRINT "<7>";
2910 PRINT "   ORIGINAL SAMPLE VOLUME: [";A7$;"] ML ";
2920 ON ERR THEN GOTO 3470
2930 INPUT "> ",V7$;

1234567891123456789212345678931234567894123456789512345678961234567897
        0          0          0          0          0          0          0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
        0          0          0          0          0          0          0
2940 ON ERR THEN GOTO 2890
2950 PRINT
2960 IF LEN(V7$)=0 THEN LET V7$=A7$
2970 LET V7=VAL(V7$)
2980 ON ERR THEN STOP
2990 LET A7$=V7$
3000 LET V7=V7/1000
3010 GOTO 3040
3020 ON ERR THEN STOP
3030 PRINT "<7>";
3040 PRINT "   DILUTION VOLUME ADDED: [";A8$;"] ML ";
3050 ON ERR THEN GOTO 3470
3060 INPUT "> ",V8$;
3070 ON ERR THEN GOTO 3020
3080 PRINT
3090 IF LEN(V8$)=0 THEN LET V8$=A8$
3100 LET V8=VAL(V8$)
3110 ON ERR THEN STOP
3120 LET A8$=V8$
3130 LET V8=V8/1000
3140 LET V9=1
3150 ON ERR THEN GOTO 2890
3160 LET V9=(V7+V8)/V7
3170 ON ERR THEN STOP
3180 PRINT "DILUTION FACTOR = ";V9
3190 LET D1[4]=V7
3200 LET D1[5]=V8
3210 NOESC
3220 FOR I=6 TO 13
3230   LET D1[I]=0
3240 NEXT I
3250 GOSUB 3570
3260 IF D1[2]<>-1 THEN GOTO 3420
3270 LET W2=W1
3280 LET W2=W2+1
3290 IF W2>W0 THEN GOTO 3420
3300 GOSUB 3540
3310 IF D2[2]<>W1 THEN GOTO 3280
3320 IF I2$[12,14]="LSF" THEN GOTO 3350
3330 LET D2[4]=V7
3340 LET D2[5]=V8
3350 PRINT USING "WHEEL POS ### ",W2;

1234567891123456789212345678931234567894123456789512345678961234567897
        0          0          0          0          0          0          0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3360 PRINT "/";I2$;"/  ALSO CHANGED."
3370 FOR I=6 TO 13
3380   LET D1[I]=0
3390 NEXT I
3400 GOSUB 3600
3410 GOTO 3280
3420 ESC
3430 PRINT
3440 PRINT "<7>PLEASE FOLLOW DILUTION PROCEDURES "
3450 PRINT "AND REMEASURE SAMPLES NOTED ABOVE."
3460 GOTO 0370
3470 PRINT "<7>";
3480 RETRY
3490 REM [  READ/WRITE (.DF) SUBROUTINES   ]
3500 REM ************************************
3510 MAT READ FILE[1,W1],D1
3520 READ FILE[0,W1],I1$
3530 RETURN
3540 MAT READ FILE[1,W2],D2
3550 READ FILE[0,W2],I2$
3560 RETURN
3570 MAT WRITE FILE[1,W1],D1
3580 WRITE FILE[0,W1],I1$
3590 RETURN
3600 MAT WRITE FILE[1,W2],D2
3610 WRITE FILE[0,W2],I2$
3620 RETURN
3630 LET J0=M0+1
3640 IF J0=5 THEN GOTO 3730
3650 READ FILE[2,4+J0],N,D0,P[1],P[2],P[3],P[4],P[5],P[6]
3660 IF P[5]=0 THEN GOTO 3710
3670 LET J0=J0-1
3680 IF J0>=1 THEN GOTO 3650
3690 LET C1=0
3700 RETURN
3710 LET C1=P[1]+S*(P[2]+S*(P[3]+S*P[4]))
3720 GOTO 3700
3730 READ FILE[2,5],N
3740 IF N<=1 THEN GOTO 3800
3750 FOR I=1 TO N-1
3760    READ FILE[2,19+I],R7,C7
3770    READ FILE[2,20+I],R8,C8

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
3780   IF S>=R7 THEN IF S<R8 THEN GOTO 3820
3790 NEXT I
3800 LET J0=1
3810 GOTO 3650
3820 LET C1=C7+((S-R7)*(C8-C7))/(R8-R7)
3830 RETURN
3840 NOESC

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                           PAGE 11
                        SYMBOL TABLE FOR ISCN12.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------

 0370   0320  0340  0480  0510  1120  2400  2550  2860  3460
 0490   0360  0430
 0500   0690  1340
 0520   0490
 0550   0520  0630
 0610   0540
 0620   0650
 0640   0610
 0700   0490
 0710   0990
 0730   0780
 0740   0720
 0850   0890
 0860   0840
 1000   0940
 1130   0490
 1190   1140  1150
 1230   1200
 1260   0680
 1310   1280
 1350   1310
 1360   1300
 1420   1390
 1440   1380
 1480   1420
 1490   1410  1430  1470  2740
 1600   1580
 1620   1580
 1640   1580
 1650   1580  1610  1630
 1670   1650
 1730   1710
 1770   1750
 1890   2270  2290  2370
 1940   1910
 1950   1930
 1970   1920  1940
 1980   1970
 2000   1970
 2020   1970
 2040   1970
 2060   1970
 2070   1860
 2080   1750
 2210   2180
```

```
     STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                           PAGE 12
                        SYMBOL TABLE FOR ISCN12.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------

 2220   2200
 2230   1750
 2280   1750
 2300   1580  1750
 2380   1510  1580  1590  1660  1750  1760  1770  1990  2010  2030
        2050  2070  2080  2220  2240  2300  2340
 2410   2390  2510
 2500   2540
 2520   2490
 2550   2530
 2640   2590
 2700   2670
 2710   2690
 2750   2380
 2780   2870
 2790   2770
 2870   2850
 2890   2940  3150
 2910   2880
 3020   3070
 3040   3010
 3280   3310  3410
 3350   3320
 3420   3260  3290
 3470   0390  0570  0760  0870  2440  2810  2920  3050
 3510   1020  1260
 3540   1440  3300
 3570   1070  2720  3250
 3600   3400
 3630   1680  1790  2100
 3650   3680  3810
 3700   3720
 3710   3660
 3730   3640
 3800   3740
 3820   3780
A$      0350  0400  0430  0490  0520  0530  1280  2380  2820  2850
        2870
A1$     0710  0750  0800  0830  0860  0910  2430  2480
A2$     0700  0770  0800  0810  0880  0910  0920  2450  2480  2490
        2520
A7$     0160  0290  2750  2910  2960  2990
A8$     0170  0300  2760  3040  3090  3120
B$      0530  0580  0610  0640  0650  0670
B0      0240
```

```
       STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
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                    SYMBOL TABLE FOR ISCN12.AS

SYMBOL    REFERENCES
------    --------------------------------------------------------------

C$        0180  0250  0340  0350
C0$       0120
C1        1690  1800  1830  2110  3690  3710  3820
C7        3760  3820
C8        3770  3820
D         1570  1600  1620  1640  1710  1720  1730  2110
D0        3650
D0$       0100  0190  0230
D1        3510  3570
D1[       0090  1030  1050  1310  1360  1370  1490  1500  1510  1530
          1540  1580  1600  1620  1670  1750  1810  1820  1830  1910
          1940  2230  2240  2250  2310  2390  2530  2580  2600  2630
          2650  2660  2670  2680  2700  2710  2750  2760  3190  3200
          3230  3260  3380
D2        3540  3600
D2[       0090  1450  1600  1640  1770  1780  1800  1830  1920  2080
          2090  2180  2300  2330  2340  2350  3310  3330  3340
E5        0260
F7$       0190  0230
FL#0      3520  3550  3580  3610
FL#1      3510  3540  3570  3600
FL#2      0190  0230  0240  0250  0260  3650  3730  3760  3770
G2        1690  1700  1730
G3        1730  1740  1870  2130  2150  2250  2280
G4        1800  1840  1870  2110  2120  2130  2150
G5        1830  1850  1860  1870
I         0640  0650  0660  1530  1540  1550  3220  3230  3240  3370
          3380  3390  3750  3760  3770  3790
I1$       0080  1360  1740  3520  3580
I2$       0080  1840  2120  3320  3360  3550  3610
J         1040  1050  1060  1900  1920  1940  1950  1960  1970  2580
          2590  2600  2610  2620  2630  2640
J0        1700  3630  3640  3650  3670  3680  3800
J1        2520  2530  2550  2590  2620
J2        2610  2620  2630
K         0310  1030  1140  2710
K0        0250  1150  1650
M         1810  1820  1830
M0        0260  3630
M0$       0080  0110  1700
M1        0260
M2        0260
M5        0260
N         3650  3730  3740  3750
N1        0250
```

```
       STANDARD   CALIBRATION   INSTRUMENT   AUTOMATION   SYSTEM
7/15/1981                                                        PAGE 14
                    SYMBOL TABLE FOR ISCN12.AS

SYMBOL    REFERENCES
------    --------------------------------------------------------------

P$        0190  0200  0210  0220  0230  1130
P0$       0190  0200  0230
P1$       0190  0210  0230
P2$       0190  0220  0230  1130  1220
P[        0090  3650  3660  3710
Q         1870  1880  1920  1940  2250  2260  2280  2350  2360
R         0250
R0        0240
R0$       0190  0230
R1        0260
R1$       0070
R2$       0070
R3$       0070
R4$       0070
R7        3760  3780  3820
R8        3770  3780  3820
R9        2150  2160  2180
S         1670  1780  2090  3710  3780  3820
S0        0240
S0$       0080  0130  0140  0150  1360  1450
S1$       0080
S9        0240
T0        0240
U0        0240
U1$       0250
U2$       0250
V6        2570  2600  2700
V7        2970  3000  3160  3190  3330
V7$       2930  2960  2970  2990
V8        3100  3130  3160  3200  3340
V8$       3060  3090  3100  3120
V9        3140  3160  3180
W         0250
W0        0240  0280  0680  0940  0980  1100  1110  3290
W1        0670  0680  1010  1080  1290  1350  1380  3270  3310  3510
          3520  3570  3580
W2        1370  1380  1390  1420  1460  3270  3280  3290  3350  3540
          3550  3600  3610
W3        0270  0710  0810  0940  0970  1010  1100
W4        0280  0830  0920  0940  0980  1010  1100  1110
X         2130  2140  2180  2310  2320  2350
X0        0250
X9        0250
Y0        0240
Y9        0240
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
7/15/1981                                                      PAGE 15
                        SYMBOL TABLE FOR ISCN12.AS

SYMBOL    REFERENCES
------  ------------------------------------------------------------------

 Z4$    0100
 Z5$    0100
```

SECTION 16

INITIALIZE.2 - THE OFF-LINE PLOT CONNECTOR

Each ISC system user will be assigned two account names for a particular instrument system. One will facilitate the access to the automated instrument system and the other will access the calibration curve plot initiator (INITIALIZE.2). The BASIC.ID command string for the off-line plotter account causes a CHAIN to INITIALIZE.2. INITIALIZE.2 simply CHAINs to the plot program (ISCN.08). Since different systems support different plot modules, the INITIALIZE.2 program is supported separately in each user directory.

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
8/19/1980                                                    PAGE  1
                       PROGRAM LISTING FOR INIT2.AS

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
0010 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0020 REM *   STANDARD CALIBRATION INSTRUMENT AUTOMATION SYSTEM (ISC) *
0030 REM *   PROGRAM: INITIALIZE.2 - SPECIAL CALIBRATION PLOTTER     *
0040 REM *            INITIATOR; CHAINS ISCN.08, AND PLOTS           *
0050 REM *   BY D.RYAN (UCCC), FEBRUARY 7, 1980                      *
0060 REM *   MOST RECENT REVISION: FEBRUARY 7, 1980                  *
0070 REM *=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
0080 PAGE =80
0120 ON ERR THEN GOTO 0140
0130 CHAIN "ISCN.08"
0140 ON ERR THEN STOP
0150 PRINT
0160 PRINT "<7>CALIBRATION PLOTTER NOT ACCESSIBLE!<7>"
0170 PRINT
0180 BYE

1234567891123456789212345678931234567894123456789512345678961234567897
         0         0         0         0         0         0         0
```

```
   STANDARD    CALIBRATION    INSTRUMENT    AUTOMATION    SYSTEM
8/19/1980                                                    PAGE  2
                    SYMBOL TABLE FOR INIT2.AS

SYMBOL   REFERENCES
------   -------------------------------------------------------------
 0140    0120
```

SECTION 17

THE SYSTEM DATA AND REPORT FILES

This section describes the form, content and usage of all files utilized in the standard calibration instrument automation system (ISC). Most of the files are common to all ISC systems. However, some additional files are created in systems which actually collect digitized peak data as in the case of analog interfaced atomic absorption instruments. Most of the ISC files are named by convention and each has an identical prefix - ISCN. This stands for Instrument Standard Calibration system number N. Run Files, Run Results File, and the system name file (INST.NM) are used by the ISC system but do not follow the naming convention. The program names follow the naming convention and their extensions are numeric. Table 19 shows the names of all data and program files associated with the ISC system.

17.1 THE SAMPLE IDENTIFIER FILE - ISCN.ID

The ISCN.ID file is a random access file with a restricted record length of 20 bytes. It contains one sample identifier string for each sample in a wheel pattern. The identifier strings start in record #1 and proceed to record #WO, where WO is the number of positions in the wheel pattern. The character strings I1$ and I2$ are used in read and write operations to the ISCN.ID file.

The ISCN.ID file is always system file #0. It is opened either in the ISCN.01 or the ISCN.00 program depending on the ASCL system entry command ('S' or '2'). The file remains open until control returns to the ASCL. Any read or write operation to the ISCN.ID file is coupled with a corresponding read or write operation to the ISCN.DF file.

17.2 THE SAMPLE DATA FILE - ISCN.DF

The ISCN.DF file is a random access file with default record lengths of 128 bytes. It contains a sample data array for each sample in a wheel pattern. The data arrays start in record #1 and proceed to record #WO, where WO is the number of positions in the wheel pattern. The data arrays D1 and D2 are used in read/write operations to the ISCN.DF file. The contents of the D1 array (and corresponding record fields) is shown below:

D1(1)	corresponding Run File record number
D1(2)	QC pointer back to primary member
D1(3)	sample-type flag
D1(4)	volume or dilution parameter
D1(5)	spike, volume, or theoretical parameter

D1(6)	average absorbance for a sample
D1(7)	number of replicate absorbances
D1(8) to D1(13)	replicate absorbance measurements
D1(14) to D1(18)	QC limits for LRB, LCM, LSO, CS, and LDX samples
D1(19) to D1(22)	QC limits for LD1 or LDX
D1(23)	reagent blank absorbance subtractor.

The ISCN.DF file is always system file #1. It is opened either in the ISCN.01 or the ISCN.00 program depending on the ASCL system entry command ('S' or '2'). The file remains open until control returns to the ASCL. All read/write operations are performed with MAT statements and each I/O is coupled with a corresponding read or write to the ISCN.ID file.

17.3 THE SYSTEM TRANSFER FILE ISCN.TR

The ISCN.TR file is a random access file with default record lengths of 128 bytes. It contains all other system data not specified in ISCN.ID or ISCN.DF. The contents of each ISCN.TR record is shown below:

Record	Contents	
0	Q(1), Q(2), Q(3), Q(4), Q(5), M0, M1, M2, M5, R1	
1	P$, F7$, P0$, P1$, P2$, R0$, D0$	
2	R0, W0, S0, U0, B0, Y0, Y9, T0, S9	
3	Q2(1), Q2(2), Q2(3), Q2(4), Q2(5), Q0, Q1	
4	C$, W, R, K0, X0, X9, N5, U1$, U2$	
5	N, D0, P(1), P(2), P(3), P(4), P(5), P(6)	
6	N, D0, P(1), P(2), P(3), P(4), P(5), P(6)	regression equations
7	N, D0, P(1), P(2), P(3), P(4), P(5), P(6)	
8	N, D0, P(1), P(2), P(3), P(4), P(5), P(6)	
9	R1$, R2$, R3$, R4$	
10	R5$	
11	R6$	
12	R7$	comments
13	R8$	
14	R9$	
15	M0, M1, R1, M2, M5, E5	
16	Z0, Z1, Z2, Z3, Z5, Z6	
17	Z7, Z8, Z9, N0, N1, N2	peak-data parameters
18	Z1$, Z2$, Z3$, Z4$, Z5$	
19	T, T1, T2, T4, U1, Z4, M3	
20	R7(R8), C7(C8)	signal vs concentration data
19+N		

Please refer to the symbol definition tables for descriptions of individual parameters.

The ISCN.TR file is always system file #2. It is opened either in the ISCN.01 or the ISCN.00 program depending on the ASCL system entry command ('S' or '2'). The file remains open until control returns to the ASCL.

17.4 THE TEMPORARY RUN FILE DEVELOPER QC FILE - ISCN.QC

The ISCN.QC file is a random access file with default record lengths of 128 bytes. It contains the default QC limits and some string descriptors used in the temporary Run File developer, It is a simple file with only five records. The contents of the file is shown below:

Record	Contents	
0	R1$, RO$, R3$, L1$, P$	descriptors
1	Q(1,1), Q(1,2), Q(1,3), Q(1,4), Q(1,5)	spikes
2	Q(2,1), Q(2,7), Q(2,3), Q(2,4), Q(2,5)	reagents blks
3	Q(3,1), Q(3,2), Q(3,3), Q(3,4), Q(3,5)	duplicates
4	Q(4,1), Q(4,2), Q(3,4), Q(4,4), Q(4,5)	control stds

The ISCN.QC file appears only in program ISCN.10 and is used to maintain some data to facilitate the speedy development of a non-SFC Run File.

17.5 THE CALIBRATION CURVE PLOT FILE - ISCN.PT

The ISCN.PT file is a sequential file containing all the data necessary to produce one or more calibration curves using conventional Tektronix-compatible graphics display devices. A block of data is stored for each curve and may include data for forced-zero linear, regular linear, quadratic, cubic, and interpolation curves. The contents of the first block of data in the ISCN.PT file is shown below:

Record	Contents	
1	R1$	
2	R4S	Heading
3	R2$	strings
4	R3$	
5	"ABSORBANCE	axis title
6	DO, P(D,1), P(D,2), P(D,3), P(D,4)	equation
7	NO, P(D,6), SYS(2), SYS(1), SYS(3)	and date
8	P1(1,1), P1(1,2)	absorbance vs
▼	▼ ▼	concentration
7+NO	P(NO,1), P1(NO,2)	data

Please refer to the symbol definition table for program ISCN.05 for descriptions of the variables.

The ISCN.PT file is always system file #5. It is opened in the write-mode in the calibration program (ISCN.05) and is opened in the read-mode in the plot program (ISCN.08). Since both programs may be simultaneously active, a delay loop is used to postpone the write operation if ISCN.PT is in use.

17.6 LIST FILES FOR THE SYSTEM - ISCN.L#

A number of 80-byte length sequential list files are created by the ISC system for report generation purposes.

The ISCN.LE file is essentially an error-notated Run File. It is produced in the ISCN.01 program if the Run File is found to have errors.

The ISCN.LW file is a wheel pattern report showing wheel positions and sample descriptions. It is generated in the ISCN.01 program after a successful translation of the Run File.

The ISCN.LC file is a standard calibration report showing the regression parameters and a table of calibration standard residuals. It is generated in the ISCN.05 program after calibration has been performed.

The ISCN.LR file is an interim RUN report showing calibration information as well as all salient information on each sample in the wheel pattern. The ISCN.LR file is generated in the ISCN.06 program and represents a detailed report on the RUN status.

The ISCN.LF file is a non-SFC Final Report for a RUN. It is generated in the ISCN.07 program and shows only the essential information obtained from the RUN.

The ISCN.LD file is a system status report which shows all important system variables in a single formatted report. The ISCN.LD file is generated in the report utility program (ISCN.11).

All of the above mentioned list files are sequential files with maximum record lengths of 80 bytes. They are usually output as soon as they are generated through the default output mode. However, the list files remain intact after their creation, and may be dumped to a lineprinter or terminal at any time through the use of the ISCN.11 report/data dumper utility.

17.7 PEAK DATA PLOT AND LIST FILES - ISCN.LP, ISCN.LL, and ISCN.PK

In the analog-interfaced flameless atomic absorption instrument systems like the Perkin Elmer 503 and the Varian AA6, certain files are produced which support peak data plotting.

The ISCN.LP and ISCN.LL files are simply list files showing data and/or a response curve for a peak. These list files are created with computed tab functions and are meant to be output to non-graphics devices like the lineprinter or standard terminal. The ISCN.LP file is created in the ISCN.03 checkout program whenever a test injection is performed and the analyst elects to view the response. The ISCN.LP file contains only one plot and no additional information except title, time, and date. The file is a sequential file and is replaced each time a new curve is plotted. The ISCN.LL file is a complete report on a Run injection. The file is a list file containing all pertinent variables in a formatted report. The ISCN.LL file is generated in the ISCN.09 program as an alternative to the graphics plot option. The data contained in the report actually comes from the ISCN.PK file which will be explained in the following paragraphs. The ISCN.LL file is written over each time a new non-graphic plot is desired.

The ISCN.PK file is a sequential file containing a block of data for each atomization measurement. The file is only produced in systems where sample atomization data is acquired in array form during a sample measurement operation. Special modules to process this type of data will be installed in the ISCN.03 and the ISCN.04 programs. The ISCN.PK file is maintained in the system unless the ISCN.03 is invoked either for testing or pre-RUN checkout. The ISCN.03 program deletes the ISCN.PK file if it exists. Every time a measurement occurs before or during a RUN, the ISCN.03 or ISCN.04 program will open the ISCN.PK file in the sequential append mode (2) and write a block of data to the file. The ISCN.PK file is read only in the ISCN.09 program which facilitates the plotting of the response curves. The contents of the first block of data in the ISCN.PK file is shown below. Each added block will be identical to the first block.

Record	Contents
1	SYS(2), SYS(1), SYS(3), SYS(11), SYS(12), SYS(13)
2	R1$, R2$, R3$, R4$, P$
3	Z1$, Z2$, Z3$, Z4$, Z5$
4	Z5, Z6, Z7, Z8, N2, N1, H0, L0, 1, E1, W1, 0, 0
5	I0, I1, I2, I3, V1, A1, V2, M1, A3, D1(7)+1, D1(3), 0, 0
6+	V (the 300 point peak-array)

Please refer to the symbol definition table for the ISCN.09 program for a description of the peak-array variables. Note that the V array will always be 300 points but in the case of double beam instruments only 150 points will be useful.

The ISCN.PK file is always system file #4. There is no possibility for the simultaneous usage of this file as is possible with the ISCN.PT file, so no delay loop is provided for opening the file in either read or write mode.

TABLE 19
AUTOMATION SYSTEM PROGRAMS AND FILES

Name	Type	Description
AUTORUN	Program	Automation system starter - chains to ISCN.00;
INITIALIZE.2	Program	Special access program for parallel/off-line plotting of calibration curves - chains to ISCN.08;
ISCN.00	Program	Automation System Command Level (ASCL) router - chains to ISCN.01, ISCN.03, ISCN.04, ISCN.08, ISCN.09, ISCN.10 and ISCN.11;
ISCN.01	Program	Translate Run File and produce wheel pattern - chains to ISCN.02;
ISCN.02	Program	Control input of pre-RUN parameters - chains to ISCN.03;
ISCN.03	Program	Define instrument parameters and check out instrument - chains to ISCN.00 or ISCN.04;
ISCN.04	Program	Major RUN control program (IRCL) - chains to ISCN.00, ISCN.05, ISCN.06, ISCN.07, ISCN.08, ISCN.09, and ISCN.12;
ISCN.05	Program	Calibrate standard - chains to ISCN.04;
ISCN.06	Program	Generate interim RUN status report - chains to ISCN.04;
ISCN.07	Program	Final Report and/or Run Results File generator (FCL) - chains to ISCN.04;
ISCN.08	Program	Calibration curve plotter - multiply entrant;
ISCN.09	Program	Raw peak-array plotter (where applicable) - multiply entrant;

TABLE 19 (contd.)

Name	Type	Description
ISCN.10	Program	Temporary Run File developer - chains to ISCN.00;
ISCN.11	Program	Report and data file dumper - chains to ISCN.00;
ISCN.12	Program	RUN editor - chains to ISCN.04;
ISCN.QC	Data file	Quality Control parameters for the temporary Run File developer;
ISCN.ID	Data file	Sample identifiers for a RUN;
ISCN.DF	Data file	Sample absorbance, volume and concentration data for a RUN;
ISCN.TR	Data file	Transfer file for RUN data shared by multiple programs;
ISCN.PT	Data file	Calibration curve plot file;
ISCN.PK	Data file	Raw peak-array plot file (where applicable);
ISCN.LC	List file	Calibration report;
ISCN.LD	List file	Data dumper report;
ISCN.LE	List file	Run File error list;
ISCN.LF	List file	Final Report;
ISCN.LL	List file	Line printer list file of raw peak data;
ISCN.LP	List file	Line printer list of test peak data;
ISCN.LR	List file	Interim RUN status report;
ISCN.LW	List file	Wheel pattern report;
-.RF	List file	Run File;
-.RR	List file	Run Results File.

REFERENCES

1. Teuschler J. M. and C. Cuciak. Atomic Absorption Furnace and the AS-1 Interface, EPA Interim Report, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, August 1978.

2. Teuschler, J. M., C. Cuciak, K. Geiger. A Computer Interface for a Perkin Elmer 5000 Atomic Absorption Instrument, EPA Interim Report, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio January 1980.

3. Taber, L., H.S. Ames, R.K. Yamauchi, and G. W. Barton, Jr. Instrument CALLs and Real-Time Code for Laboratory Automation, UCRL 52392, Lawrence Livermore Laboratories, University of California, Livermore, California, June 1978

4. Prairie, R. The Functional Specifications for a Foreground Sample File Control System, EPA Interim report, Computer Services and Systems Division, Cincinnati, Ohio.

5. Kopke, J. The User's Guide to CALPLOT, Inhouse report, University of Cincinnati Computing Center, Cincinnati, Ohio.

6. Kopke, J. Description of the Tektronix-Compatible Plot Subroutines, Inhouse report, University of Cincinnati Computing Center, Cincinnati, Ohio.

7. Boyle, W.C., Jr. Computer Programs in BASIC Language for Graphite Furnace Atomic Absorption Using the Method of Additions, Part 1 - Operating Instructions and Part 2 - Documentation, UCRL-52810, Lawrence Livermore Laboratories, University of California, Livermore, California, July and August 1979.